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The INDUSTRIAL-ARTS MAGAZINE

JULY - 1927

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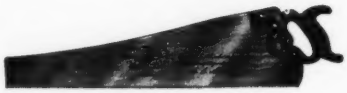

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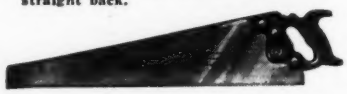

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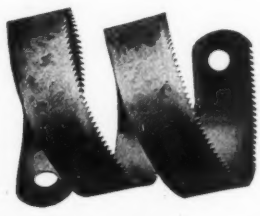

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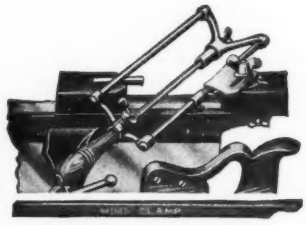

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THE INDUSTRIAL ARTS MAGAZINE

Volume XVI JULY, 1927 No. 7

FACTORS AFFECTING THE USE OF INSTRUCTION SHEETS

Verne C. Fryklund, Department Industrial Education, State Teachers' College, Kearney, Nebraska

THE USE OF PRINTED FORMS of instruction has met with some opposition because of the belief that the difficulty in comprehension of printed material is a characteristic of all individuals—adults as well as young people. Because of this belief, printed instructions are thought by many to be of little value as a device for imparting information, directing study, or for shop instruction. It is based on a theory that many of the pupils who come to the shops are probably motor-minded, that they can learn only from spoken words and through concrete observation. Scientific investigation has proved false the belief that there are type-minded people.

Printed forms have been avoided by those who believe that they are only successful with exceptional individuals who are gifted with the ability to understand written directions. Because of this belief, group oral instruction is resorted to entirely. Individual differences do not seem to be sufficiently important to call forth new methods for overcoming them. Class progress is conditioned by the slow-progress pupils because they are the ones who have difficulty in the comprehension of either oral or written material. The class as a whole is reduced in achievement to the level of the poor thinker and the poor reader.

Avoiding Type-Mindedness

The belief that interpretation of facts or information from the printed page is a special ability that only a few individuals possess, is not based on scientific truth.[1] As a matter of fact, all individuals possess all types of abilities in varying degrees. They only need to be subjected to the proper experience to attain their limit of development. There are no definite eye-minded individuals who understand only through written directions, nor are there definite motor-minded individuals who can learn only through concrete experiences or demonstrations. We are all more or less eye-minded or motor-minded and must depend upon experience for special development of these abilities. Experience in reading and comprehending written directions will develop ability in reading and comprehending written directions. Likewise, experience in comprehending oral instructions will develop ability in comprehending oral instructions.

A sufficient amount of the right experience will result in habit. One is said to be motor-minded or eye-minded because the habit of being motor-minded or eye-minded has been established. If we are habituated in certain ways of doing things we are annoyed by, and avoid any suggestion of change. The fellow who has been working in a shop for a number of years is not necessarily type-minded because it is difficult for him to give attention to a language. He is in a habit of applying himself to shop and it is therefore annoying for him to try to effect a change to language. He is annoyed by a change and is satisfied when applying himself to his accustomed shopwork. The law of effect operates.

Oral-Instruction Habits

Group oral instruction which has been in use for so long as the prevailing type of instruction has provided sufficient experience for us to develop fixed oral-instruction habits. To be required to read and execute from written directions is annoying to the individual who has a habit of learning entirely from the demonstration of the instructor. He may try to avoid their use or he may become confused and be unable to comprehend the facts. It is quite probable that if individual differences had been recognized and individual printed instructions had been used in the beginning of the shop movement, that considerable objection would be raised today toward any change.

Our habits are not easily changed. We are prone to avoid suggestion of change unless we are convinced. However, recent developments in organizing subject matter through analysis, and the ever-increasing importance of industrial training especially in all-day and part-time schools suggests that better attempts to equalize the effects of individual differences must be taken into account. By emphasizing group instruction entirely we assume that there are no differences in ability in comprehension and in rate of learning. Shop teachers of experience in day schools or part-time schools find that it is their outstanding problem.

Reading is a Significant Factor

Progress in teaching academic subjects offers suggestions in developing means for overcoming problems in individual differences. The principles underlying silent reading should be taken into account. This may help us in giving more consideration to printed forms of instruction. Much of the difficulty, even when using the best forms of written instructions, is probably due to habits of reading which are fixed

[1] Gates, Psychology for Students of Education, pp. 280-283.

in the pupils that come to our shops. Reading is fundamental in learning any subject. In order to learn in mathematics, history, science, drawing, and shop, one must be able to read.

Reading habits that have been established at some time in the early training of the pupil before he comes to the shop, or the drafting room, are partly responsible for difficulties that arise in the use of printed instructions. The use of instruction sheets is nothing more nor less than reading. It is a type of reading that requires comprehension; it offers one of the best and most practical means of determining comprehension in reading; it is typical of all silent reading for technical information purposes. While training in articulation, correct pronunciation and proper modulations may be highly important in oral reading, they are of little value for interpreting information. Reading of instruction sheets is but one of a host of applications for real reading. It is doubtful if opportunities in the practical affairs of life ever exist for display of the oral technic of reading.

The proper training in reading habits should be recognized by industrial teachers. It is not proposed that industrial teachers establish reading courses, for the probability is that they themselves may be victims of poor reading habits. It is desirable, however, that the probable weaknesses of pupils in reading habits should receive consideration before assuming that there is type-mindedness. Much can be done by shop teachers who are beginners in the use of instruction sheets to be tolerant in the face of seeming unsurmountable difficulties. Assistance given to individuals in the comprehension of words is, as a rule, the first need of beginners in reading instruction sheets. In many instances the shop teacher will be required to give the pupil his first training in reading for comprehension. A pupil trained in silent reading should have little difficulty in reading and comprehending instruction sheets. He has been trained to read for information and for speed in getting this information. His limit of accomplishment is determined by his intellectual capacity and the slower individuals in the class need not condition his progress.

Influence of Intelligence

Comprehension of written instructions may be affected by varying degrees of intelligence as well as by poor reading habits, although the latter may be in the majority. Intelligence will probably only affect the speed in most cases. However, it is an important factor because intelligence is necessary to grasp any form of instruction, whether oral or written. If a pupil cannot grasp oral instructions because of deficient intelligence, he certainly cannot grasp written instructions, and vice versa. One advantage of written instructions lies in the fact that they remain and can be read and reread, and are thus better for those who are slow in comprehending, while the oral instructions are gone forever. The complete loss of the oral instructions varies inversely with the amount of intelligence of the learner.

In continuation-school work this is more significant than it is in all-day schools. A process of selection takes place at the school-leaving period which, due to the variety of circumstances, seems to select many of the individuals of less intelligence who must attend continuation schools. Of course, there are exceptions. But the majority is quite likely to be represented on the lower end of the intelligence scale.

Along with poor reading habits, then, we also have chances for inferior intellectual abilities which suggests that extreme care must be taken in preparation of material for instruction. It suggests that since good intellect is necessary for comprehension of oral instructions, as well as for printed instructions, the choice may be in favor of printed instructions, if well written, because they can be used again and again by those who are slow in comprehending. They can regulate their speed in comprehension to suit their capacities; they can repeat difficult directions; they can supplement difficult directions with oral assistance of the instructor. The brighter pupils also have added benefits by proceeding as fast as their comprehension and work limits will permit.

For those who write their own instruction sheets a knowledge of the probable reading habits and the intelligence of those who will use them should be taken into account in the selection of content and in the selection of words. Publishers of books for young people are becoming more and more critical in the selection of words by their authors. Manuscripts receive the most careful scrutiny for difficult words. If this is significant for those who produce large quantities of reading matter for young people in order that they may understand readily, it certainly deserves the attention of individuals who write instruction sheets and wish to have them readily understood. The content should be well within the pupil's level of experience, the words within his range of comprehension and both completely and definitely organized to teach how to do a definite thing.

Word Selection Deserves Careful Attention

Experimental work in academic subjects has brought out significant information for teachers in all subjects with regard to selection of words. It has been found that certain words are often too unimportant and too difficult to be given a place in the learner's reading. The tendency in oral as well as in written instructions is to use words that are beyond the range of comprehension of the learner. Because oral instructions are not in permanent form, it is difficult to determine the words that are beyond his comprehension. These words cannot be scrutinized to determine if they are the causes of difficulty. But since written instructions are in permanent form, we have an opportunity to examine them.

All industrial teachers are familiar with the fact that many of their pupils have limited vocabularies. Words that are little used in everyday life, as well as special technical words, are not always fully understood by them. In some instances substitutions should be made in favor of words in more common use. In the case of technical words substitution is not always possible and care must be taken that they are fully understood. The best way of doing this is to write the instruction sheet and examine it, comparing the words about which there is any doubt and make substitution when possible. Technical words, for which there are no substitutions, should be selected out and their meaning made clear to the pupils.

Thorndike[2] offers a list of 10,000 words, giving their importance and frequency of use. By checking with this list, one can readily detect words whose use in the instruction sheet are doubtful. For example, along with a number of others, the following assignment sheet was checked carefully for doubtful words and compared with the Thorndike list:

ASSIGNMENT SHEET

How to Calculate Board Measure

Information:

(1) A board foot is a piece of wood 1 in. in thickness, 12 in. in width and 1 ft. in length.

(2) Boards less than 1 in. in thickness are always calculated and paid for as if they were 1 in. thick. For example: stock ¾ in. by 12 in. by 12 in. is to contain one board foot. Also a piece ¼ in. by 12 in. by 12 in. is equivalent to one board foot.

[2]Thorndike, "The Teacher's Wordbook."

When the stock is over one inch in thickness the additional thickness is taken into account. For example: stock 1½ in. by 12 in. by in. 12 contains ¼ more than a board foot or 1½ board ft.

(3) The following formula gives an accurate solution of any problem in board measure:

$$\frac{\text{Thickness in inches (never less than 1 inch)} \times \text{width in inches} \times \text{length in feet}}{12} = \text{board feet}$$

$$\text{or } \frac{T'' \times W'' \times L'}{12} = \text{board feet}$$

Illustrations:

(1) What is the board measure of a piece of wood 1″x8″x10′? Substitute in the formula and we have $\frac{1''x8''x10'}{12}$. By cancelling and clearing the formula we have 6⅔ board feet.

(2) What is the board measure of a piece of wood ½″x8″x10′? In this case ½ is considered as one inch. Substitute in the formula and we have $\frac{1''x8''x10'}{12}$. By cancelling and clearing the formula we we have 6⅔ board feet.

(3) What is the board measure of a piece of oak 1¼″x8″x10′? In this case we take into account the extra ¼ inch in thickness. Substitute in the formula and we have $\frac{5/4''x8''x10'}{12}$. By cancelling and clearing the formula we have 8⅓ board feet.

Your Job:

Calculate the following problems, using the formula and the table:

(1) How many board feet in a piece of oak 1″x5″x12′?
(2) How many board feet in a piece of pine 1″x11″x20′?
(3) How many board feet in 6 pieces of oak 1″x7″x12′?
(4) What is the cost of a piece of walnut 1″x5″x8″ at 30 cents per board foot?
(5) What is the cost of a piece of pine 1″x10″x18′ at 15 cents per board foot?
(6) What is the cost of a piece of pine ½″x6″x14′ at 12 cents per board foot?
(7) What is the cost of 15 pieces of plywood ⅛″x18″x4′ at 6 cents per foot?
(8) How many board feet in 2″x4″x10′?
(9) What is the cost of 6 pieces of oak 1¼″x8″x10′ at 25 cents per foot?

Some words were found that appeared without inspection, to have frequent use and should be easily understood by the average learner. However, the word "equivalent" is not as common as one would assume. In a vocabulary of 7200 words it was found to be ranked in the last 600 for importance and frequency of use. The word "equal" is ranked in the first 1000. This means, rather than to use the word "equivalent," the word "equal" should be substituted in order to assure a better chance for success in comprehension. The word "additional" is ranked in the last 500 of a 5000-word vocabulary. The word "added" is ranked in the first 500 and would be a more satisfactory word to use. The word "illustrations" is also ranked low and should be replaced by the word "example" which has a frequent occurrence. There are sixteen words in this assignment sheet that are probably too difficult to be clearly understood by the average continuation-school or ninth-grade pupil. Substitutions should be made when possible or, as in the case of technical words, care should be taken that they are clearly understood.

It was found that certain technical words in the assignment sheet were not in the Thorndike word list. The word "formula," for example, is used three times and is not in the list. The word "decimal" has only a slight occurrence. Such technical words cannot be changed without altering the meaning and it is desirable that they be retained. The indications are, however, that they may not be understood and that their meaning should be made clear to the average part-time pupil.

The vocabulary of a part-time pupil is probably not over 4000 words, and care should be taken that words commonly found in a larger vocabulary are not used in writing instruction sheets. It is even more important that the words in oral instruction are within the comprehension of the learners. Printed words remain and can be studied by the pupil; spoken words cannot be studied. Selvidge[3] says that if a teacher cannot prepare an instruction sheet so that a pupil will understand it, it is probable that he cannot do it better by oral instruction.

Low intelligence, poor reading habits, and use of difficult words are factors that must be taken into account in any kind of teaching. Type-mindedness must be neglected as a factor that either favors or interferes with any kind of instruction. More emphasis must be given to habit in cases of suspected type-mindedness. If we would recognize that many difficulties are caused by habits of doing things in the wrong way, many of our troubles would cease. We are annoyed at the thought of changing fixed habits; we hesitate to break them and build new ones. We do not like the thought of changing old ways of teaching, but we shall sooner or later be compelled to strengthen our methods to better provide for individual differences. Improving written instructions and using them effectively is probably one of the best means of attaining this end.

[3]Selvidge, "Individual Instruction Sheets," p. 7.

TECHNICAL EDUCATION IN DENMARK

Herman Hjorth, Saunders Trade School, Yonkers, N. Y.

THE MOST STRIKING THING about the system of technical education in Denmark is that it is not general but specific. In the United States we are offering all sorts of courses, technical and vocational, to all sorts of people in a generous, but more or less hit-and-miss way. In many cases we have no assurance at all, but only a vague or even forlorn hope that a large percentage of the students thus gratuitously trained will eventually follow the trade in which they have received instruction.

They are not doing it that way in Denmark. They are not offering technical courses either gratis or promiscuously, and not at all in the public schools, but they see to it that everyone learning a trade receives a certain amount of technical instruction.

The Apprenticeship System

The apprenticeship scheme of instruction, which works very smoothly and efficiently, is built on the foundation of the old apprenticeship system, which is still effective in Denmark, although it has lately shown disturbing signs of disintegration.

A study of the contracts entered into by employers and apprentices is very illuminating, and is perhaps the quickest way to get an understanding of the plan provided by law. While space does not permit the quotation of the law, which is printed in every contract *verbatim*, the following extracts will no doubt prove interesting:

1. Every contract must be signed by the apprentice, his father or guardian, and the employer. Its legality must also be attested to by the civil authorities, in most cases the chief of police.

MACHINE SHOP AT THE INSTITUTE OF TECHNOLOGY, COPENHAGEN, DENMARK.

2. Every prospective apprentice must be 14 years of age and have obtained working papers from the school he has attended.

3. No apprentice contract is entered into by messengers, laborers, or persons engaged in the production of specialized work which does not require an all-around training.

4. The length of the apprenticeship must not exceed five years. The first three months of this time is considered a period of trial for both parties, during which both the employer and the apprentice may terminate the contract at will.

5. The contract must specify the wages to be paid the apprentice while he is learning the trade, but any agreement between employer and apprentice beyond the completion of the apprenticeship is illegal.

6. The employer must pay the tuition fees in a technical school, provided the apprentice is attending the school regularly. The apprentice, however, must pay for all materials needed for the instruction. It is the duty of the employer to see to it that the apprentice attends school regularly.

7. No apprentice must work longer hours than a journeyman, with the exception of ½ hour's cleaning-up work each day. The attendance at the technical school must be outside of working hours, but these must be so arranged that they do not interfere with such attendance. No instruction must be given after 9 p. m. The school gives the apprentice a certificate upon completion of the course.

8. The period of apprenticeship must be so arranged that the apprentice gradually learns that trade or part of it, which he is apprenticed to learn, so that he, at the end of the apprenticeship period, is able to demonstrate his proficiency by undertaking the construction of an advanced piece of work. The materials needed for this work must be furnished by the employer. In case the apprentice does not care to present such manual evidence of his skill, the employer must give him a certificate attesting to his proficiency in the trade and the length of the apprenticeship served.

9. If the employer has been negligent in providing for the proper training of the apprentice, so that the latter, after completing his apprenticeship, is unable to undertake the customary manual work or obtain a corresponding certificate of proficiency, the employer is obliged to pay him an indemnity. The justification for such indemnities, as well as the amount is decided upon by a board of arbitration, whose findings in the case are final and cannot be appealed to any court of law.

10. The employer must see to it that the apprentice is insured against sickness and accidents, and must pay the premiums of such insurance.

11. No employer has a right to take on an apprentice: (*a*) If he has not served an apprenticeship himself in the trade in question, or provision is made for the proper training of the apprentices by a trade-trained person employed by him. (*b*) If he has committed a prison offense, unless he has later obtained his rights as a citizen. (*c*) If he three times within five years has broken apprentice contracts. (*d*) If he twice within ten years has been found guilty of neglecting the training of his apprentices. (*e*) If his factory or shop has been stopped three times, causing cancellation of apprenticeship contracts. (Strikes, lockouts, or natural forces are excepted.)

12. The apprenticeship contract can be terminated: (a) When the employer dies. (*b*) When his business is stopped for more than two months. (*c*) When the apprentice unlawfully leaves and the employer within 14 days neglects to demand either that he is brought back or an indemnity paid. (*d*) When either the apprentice or the employer commits a criminal offense. (*e*) When the factory is moved to another municipality. (*f*) When the employer has been absent for more than three months, and no provision made for the proper training of apprentices. (g) When the apprentice through sickness is unable to properly learn the trade.

13. No apprentice can be employed in the same trade by a second employer before the first contract has been duly terminated.

14. The apprentice must be faithful, obedient, and respectful toward his employer and work willingly and to the best of his ability and strength.

The above is a brief account of the apprenticeship law of 1921. No attempt has been made to make a literal translation of it. Only its most important phases—in the judgment of the writer—have been selected and presented in the fewest possible words. At present it works very well. Almost without exception every apprentice in every trade gets a thorough practical as well as theoretical training. But it is a fact that the modern employers in increasing numbers become more businessmen and less craftsmen. Moreover, the younger journeymen are not interested in the training of the apprentices, and it is only the older generation of journeymen that still feel this old-time obligation of teaching the younger members of the trade their craft. Specialization, largely through the aid of modern machinery, is also sounding the death knell, though still faintly, of the apprenticeship system in Denmark. That these causes, severally and in combination, are at work, can be shown by the fact that employers are occasionally forced to pay large indemnities to apprentices

whose training has been neglected. Another sign is the establishment by the skilled workers themselves of an increasing number of trade schools to supplement or in some cases wholly take the place of the shop training.

Development of Technical Education in Denmark

To get a true perspective of the whole situation, it is necessary to briefly trace the development of technical education in Denmark.

Before the year 1800 all apprentices were trained exclusively in the shops. The majority of them were, therefore, rather ignorant persons—except for their technical skills—and greatly in need of education. On the initiative of progressive men, outside the ranks of the skilled workers themselves, several "schools of drawing" were established in the early part of the nineteenth century both in the capital and other cities throughout the country. A typical example of this type of school was the "Massmann Sunday School" which was established in Copenhagen in 1800 on the initiative of a minister, the Rev. N. H. Massmann, and which gave instruction in writing, arithmetic, and drawing to about 25,000 apprentices during a period of a little more than a hundred years. As a matter of fact, many of the existing technical schools are an outgrowth of these early "schools of drawing" and built on their solid and conservative foundation.

But also the skilled workers saw the need for technical schools and established the first trade school for metal workers in Copenhagen as early as 1807. But not until 1857, when the old guilds were abolished by law, did the number of technical schools grow rapidly. Craftsmen's associations were then formed in every city in the country, and these associations all made it a point to provide for the proper training of apprentices. In 1860 there were 18 technical schools in the country, in the following five decades the number increased to 42, 62, 89, 110, and 154 respectively, in 1916 to 182 and in 1924 to 256 schools.

Types of Technical Schools

The majority of these schools have been established by the local craftsmen's organizations, which own and operate them. A smaller number are owned and operated by a technical society, i. e., an association of which persons other than craftsmen may be members. The craftsmen, however, must have a majority control in the management of the school. A few privately-owned technical schools are also recognized by the government.

All these schools receive financial support from the government. They are supervised by a representative of the government appointed by the secretary of commerce. The present incumbent, Professor Alfred Lütken, from whom the writer has received much help in this study, and from whose writings he is quoting freely, has been in charge of the supervisory work since its present reorganization in 1916.

Before a new technical school can be recognized by the government and receive financial aid from it, the following regulations must be complied with. The craftsmen's association or the technical society in question must establish the school and operate it for at least one year before it is eligible to financial support from the government. The office of the director, however, is ready to help the association from the very start with educational advice and materials. The supervisory force, therefore, is usually acquainted with the work of the school before the question of government aid can be taken up. This aid amounts to about 50 per cent of the total expenses of the school. Forty per cent is contributed toward the payment of rent, salaries and materials, and the rest consists of a fixed sum calculated according to the following classification:

Class A. Evening schools offering courses in preparatory drawing, Danish, writing, and arithmetic. The aim of this type of school is to prepare apprentices to become journeymen.

Class B. Day and evening schools offering the same type of instruction as the schools in Class A.

Class C. Evening schools, which, besides the elementary course described in Class A, offer more advanced courses in mathematics, physics, materials of construction, bookkeeping, sociology, etc. The aim of the advanced course is to prepare apprentices for positions beyond the journeyman stage.

Class D. Day schools of the same type as Class C.

Class E. Day schools with a two-year course (5 months each year) in decorative trades, metal trades, electrical trades, and woodworking trades. Evening schools offering identical courses, but where the instruction of necessity extends over more than two years.

Class F. Day schools with a four-year course (5 months each year) in decorative trades, metal trades, electrical trades, woodworking trades, and building trades.

A technical school can belong to more than one class if it offers instruction of the kind and to the extent prescribed for each class.

In this scheme of technical education the Danish Folk High School takes a peculiar and unique position. In view of the fact that so much has been written about these schools—both for and against—it is difficult to characterize them in a few words. Their aim is to give the young people on the farms a cultural education through the medium of short, popular lecture courses. As one writer, cand. polyt. G. F. Barfoed, puts it: "It has never been the intention of the Folk High Schools to give positive knowledge, but the following results are claimed for it: It has taught the Danish farmer to think for himself, it has given him interests beyond the limits of his village, it has given him interests for methods of cultivation other than those of tradition, it has given him a desire to learn....."

Some of these high schools have technical departments in charge of trade-trained teachers. Four hours each day is given to the cultural education and four to six to the technical education, which conforms to the standards laid down by the department of commerce. These schools have done much good in extending the horizon of their apprentice students beyond the narrow technical limits. But as the technical courses are controlled by the department of commerce and the cultural courses by the department of education, and as they receive government support from both of these departments, their position is somewhat amphibious and, in the opinion of Prof. Lütken, perhaps not tenable in the long run.

Organization and Courses of Study

In the opinion of the skilled workers the most important problem of the technical schools is to provide instruction in the evening for the apprentices. All technical schools, therefore, have such an evening school (see Class A above).

The city evening schools are in session 22 weeks each year, five evenings per week, two hours per evening, making a total of 10 hours each week, or 220 hours each year. The instruction is divided into preparatory drawing, which is required of all apprentices, and trade instruction. The preparatory drawing, which can be completed in the first year, consists of free-hand drawing from models, geometrical drawing, and elementary orthographic projection. The trade instruction consists mainly of trade-drawing, which of course differs for each trade. It usually takes two years to complete this course, so that the entire technical instruction for apprentices embraces

a period of three winters, and four if Danish, arithmetic, and bookkeeping are included in the course.

The country schools are often obliged to curtail the instruction to three nights a week on account of the distance the students frequently have to travel. This means that the total number of hours per year is reduced to 132, of which one third is devoted to instruction in Danish and arithmetic, leaving only 88 hours to drawing. It therefore takes two winters to complete the preparatory drawing. The country schools give two or three years to trade instruction, depending upon the length of the apprenticeship (four or five years). The instruction in Danish and arithmetic is continued through all classes in the country.

The larger schools in the cities have certain advantages that the smaller schools in the country districts do not have. They can obtain better trained teachers and divide the trade instruction into classes according to trades. In the smaller schools on the other hand, one teacher is often obliged to give trade instruction in all trades. The result as a rule is much better than should be expected, because the instructor usually can get information and advice from the master craftsmen in the vicinity. Moreover, the apprentices in the country, although intellectually inferior to those of the city, are generally more skilled in their trade, because the employers in the country have time to instruct them personally. Another factor in favor of the country schools is that the apprentices in the country are more anxious to learn, because they see a possibility of some time going into business for themselves. In the cities, on the other hand, the number of apprentices is so great that the possibility of ever being able to start in business for themselves is very remote. The majority of them, therefore, do not think beyond the journeyman stage and are only too anxious to get through with the required theoretical work in the shortest possible time.

The purpose of the day technical schools, as stated above, is to give an advanced technical training to those students, who wish to prepare for positions of more than journeyman rank. These schools are usually only in session during the winter months, so that the apprentices can work at their respective trades during the summer.

An example of such courses is a four-year course in building construction offered by the Technical Society's school in Copenhagen. This school is in session from the 1st of November to the 31st of March, and the number of hours of instruction per day is eight, Saturdays included. The prerequisites for admission are that the student is 16 years of age, that he has worked two summers as an apprentice in some building trade, and that he has completed the preparatory drawing course required of all apprentices or its equivalent.

The subjects and the number of hours devoted to each are shown in the following plan:

Subjects	I	II	III	IV	Weekly Hours	Total Hours
Danish	2	2	2	..	6	105
Bookkeeping	..	..	..	3	3	52½
German	..	..	3	3	6	105
Mathematics	10	4	..	..	14	245
Physics	4	5	..	..	9	157½
Chemistry	3	..	..	..	3	52½
Strength of Materials	..	4	3	..	7	122½
Foundations	..	2	..	..	2	35
Free-hand and Perspective Drawing	6	6	2	..	14	245
Projection Drawing and Shadows	12	..	..	..	12	210
Statics	..	8	6	6	20	350
Building Construction	10	12	17	19	58	1,015
Measuring and Sketching	4	8	9	10	31	542½
History of Building	..	..	4	3	7	122½
Estimating	..	..	4	..	4	70
Building Hygiene	..	..	..	4	4	70
Building Law	..	..	..	3	3	52½
Surveying	..	..	½	..	½	10
Total	51	51	50½	51		

Seventeen and one-half weeks of actual instruction are calculated.

This school also offers two three-year full-time day courses of six classes each in machine construction and electrical construction respectively. Only students who have completed their apprenticeship in some metal or electrical trade are admitted to these courses. All instruction in day schools is paid for by the apprentice himself.

The Trade Schools

Besides these technical schools, which largely give theoretical instruction directly related to the different trades, a number of trade schools have been established which either supplement the instruction received in the shops or take its place entirely. At present it is practically impossible to learn the manual skills required in many trades entirely in the shops. This is due to the increasing disintegration of many trades into specialties. The following trades are now taught wholly or in part in trade schools: painting and decorating, tailoring, shoemaking, watchmaking, sheet-metal work, typography, bookbinding, photography, glazing and picture framing, barbering and hairdressing, weaving, chimney sweeping, cooking, art industries, and dressmaking.

A typical example of this kind of school is the watchmakers' school in Copenhagen. This school began its work in 1889. It is owned and operated by the Danish watchmakers, being governed by a board of directors who appoints the teachers. Two members of the board must visit the school at least once every week. The income of the school consists of a fixed annual contribution from the government, contributions from members of the trade, tuition fees, and fees for repairwork done for member of the trade by the students.

Students, who learn the trade entirely in the school serve an apprenticeship of four years. Apprentices in the watchmaking trade in Copenhagen serve an apprenticeship of 4½ years in the commercial shop and an additional ½ year in the trade school. They must moreover attend the evening technical school held at the trade school for three winters. The employers pay for the evening-school instruction, but the apprentices themselves pay for the last half-year's trade instruction.

The last link in the chain of technical and trade schools is the Institute of Technology in Copenhagen. This is really more than a trade school, because it gives the most advanced instruction to masters and journeymen, examines materials of construction in its laboratories and gives the most expert help and advice on all technical questions. It will be more fully described in a later article.

The Cultural Education of the Craftsman

It is a recognized fact that the young Danish craftsman is in danger of running behind his brother, the young farmer, with regard to general cultural education. Although he has generally had the advantage of attending better public schools in the cities, the instruction he has received in the evening technical schools has been on the other hand, too narrow and limited. In comparison the instruction given the young farmers in the folk high schools and the agricultural schools has been much wider in scope and a great deal more cultural in character. This has had an inspiring, awakening and impulse-giving influence on the whole farm population, the practical results of which can be seen in the general prosperity of the farmers, the up-to-date methods of agriculture, dairying and stock breeding, and the large and powerful cooperative associations.

A teacher in the folk high schools, Mr. Jens Rosenkjaer, M.S., treats the subject of cultural education in the technical schools as follows:

CABINETMAKING SHOP AT THE INSTITUTE OF TECHNOLOGY, COPENHAGEN, DENMARK.

"In the first place it is of course necessary to train for the technical skills in order to develop the expert workman; but besides this aim these schools should also seek to reach the man in the craftsman and include the human and cultural education in the work.....It is in many cases not the gun that brings the victory, but the man behind it; and so it is with tools, plow, yes, in many cases even with mere technical skill—it is not these things alone that determine the good results in work or in life, but much more the man behind the tools and plow, the man behind his knowledge, the personality. And ought we not to form this connection in about this way: A good man does a good piece of work—but a good piece of work makes also a good man?.....The good, careful, conscientious piece of work sets its stamp on the one who has made it, even as the opposite does....

"One of the saddest problems of our times is the constantly decreasing loss of joy derived from work itself. This is caused by the modern methods of specialization.....when the work of the individual only amounts to a small fraction of the whole. Here we are confronted with another problem, to seek both by theoretical and practical means to give the young workman an understanding of the continuity of the whole working process, to give him a feeling of responsibility, to educate him to understand that the individual becomes a nonentity in the whole, if he will not be a part of it and serve the whole....."

The technical-school association is aware of these conditions and has induced the government to appropriate a sum of money annually to be spent on cultural education in the technical schools throughout the country. This sum is divided proportionately among the schools and used by them to pay for lectures on cultural subjects. It is the aim of the lecturers to speak briefly and clearly on subjects, in which the students are interested.

Statistics

To get a clearer oversight over the whole system of technical education in Denmark, it might be well to close this paper with a few figures. The growth of the system can be shown by the following table:

	1914-15	1922-23	Percentage of Increase
No. of Schools	176	251	42.2
No. of Students	18,158	24,700	36.0
No. of Hours of Instruction	300,000	400,800	33.5
Total Expense	Kr. 1,129,900	2,775,700	125.7
Government Aid	Kr. 385,000	1,212,700	215.0

During the year 1923-24 the number of technical schools was 256 with an enrollment of 24,970, of which 22,535 attended the evening schools only, 1759 the day schools only, and 676 both day and evening schools.

As to the ages and sex of the students the figures are as follows:

Below 14 years of age	450 students
Between 14 and 20 years of age	21,927 students
Over 20 years of age	2,593 students

A total of 24,171 male students attended 256 schools and 799 female students attended 83 schools.

Origin of Pupils

From	Percentage
Copenhagen	17.45
Other cities	39.23
The country	42.00
Foreign countries	1.23

Length of Time Pupils Attended School

Years	Percentage
2	62.7
3	37.8
4	18.5
5	6.5
Over 5	1.6

The average time of attendance at the technical schools has been 2.28 years.

As already indicated technical instruction in Denmark is not given gratis, only nine schools are exceptions to this rule. The government pays about fifty per cent of the expenses of the technical schools, the rest is contributed by the municipalities, trade associations, legacies and private individuals. The trade schools receive a fixed amount by the government and make up the rest in a similar manner.

Besides these amounts the government contributed during the fiscal year 1923-24 the following sums to the advancement of the education of the skilled workers.

To cultural education of the skilled workers, textbooks, etc.	Kr. 25,000
To living expenses and tuition fees of poor students attending technical schools	180,000
To student excursions	1,000
To living expenses and tuition fees of poor students attending trade schools	3,500
To teaching materials and lectures in the trade schools	2,500
To teacher-training courses	35,000

Altogether the various contributions of the government to technical education during the fiscal year 1923-24 amounted to about 2,200,000 kroner. As Professor Lütken says: "It has in all cases been a help to self-help, which does not deprive the artisan of the initiative or responsibility of the management of the technical schools. They have therefore retained their interest in the work of the schools, which so effectively supplement the shop training. Without this interest the instruction might easily become stereotyped and remote from life."

STANDARD TESTS IN INDUSTRIAL ARTS —WOODWORK

Harry B. Nash, Director of Educational Measurements, and Roy R. Van Duzee, Supervisor of Industrial Arts, West Allis, Wis.

ONE OF THE SIGNIFICANT DEVELOPMENTS of modern education is the growth of the scientific measurement of school products. It is unnecessary at this time to offer any apology for such scientific measurement. The early stages of experimentation have been safely passed through and objective measurements have so firmly established themselves that everywhere progressive school systems have accepted them as a fundamental part of their regular procedure.

Due to the fact that in the elementary school there has existed more common agreement as to the content and placement of academic subject matter, the measurement movement has had its greatest tryout and has received the widest application in this field. The movement is, however, gradually but surely extending to the high school, and many schoolmen seem to think that there is an even greater field of usefulness for scientific measurement in secondary schools than in elementary schools. Evidence of this is found in the increasing number of high-school achievement tests that are appearing and the widespread use of the same.

The scientific-measurement movement has as yet scarcely made itself felt in the field of industrial arts. The difficulties of placement and content of material, which difficulties have retarded the movement in the field of academic secondary education, have undoubtedly operated in the field of industrial arts. Added to these obstacles are such others as the relative emphasis that should be given in a particular subject to skills and related material, the amount of time that should be devoted to industrial-arts work, and the lack of agreement as to what are the standards of attainment the pupil should possess upon completion of a given unit or units of work.

The problem of scientific measurement in industrial arts divides itself into two parts: There is the measurement of the pupils' technical and related information covering such content material as may be tested objectively on paper, and then there is the objective measurement of the pupils' skill to do the fundamental operations involved in the particular subject in which he is being tested.

The present article deals only with the measurement of the former. This does not mean that the authors feel that the latter cannot be tested objectively. On the contrary, they feel that it can be and are at present developing a technic whereby this can be done.

The industrial-arts movement has gone through four definite stages in arriving at its present development. The first courses stressed formal discipline; in the second stage interest was considered paramount; craftsmanship was the outstanding feature of the third stage—none of these stages stressed related information. In the latest, or industrial-arts stage, information and experiences relating to materials, processes, methods of manufacture, and guidance information have a significant place in instruction.

The present content of industrial-arts courses then provides a large body of material capable of being objectively tested on paper. The difficulties pertaining to this testing are no greater than the difficulties in the field of academic secondary education. In fact, in many instances they are common difficulties.

One criterion of a scientific test is that it parallels the objectives and content of the best teaching practices in that field. Curriculum-building programs which have been carried on recently have done a great deal to clarify industrial-arts objectives, both to fix general objectives and unit objectives and also to establish the purposes of each individual lesson. At the same time, courses of study are being worked out showing careful analysis, selection, and arrangement of what is to be taught, what must be known, and what must be accomplished. Better methods are being developed in the teaching of the content, and standards are being established for each industrial-arts subject.

This work has helped prepare the way for scientific measurement in industrial arts. As will be shown, all such available material has been used in the construction of the standard woodwork test[1] described in this paper.

Scale A, of a woodwork test which the authors have constructed and which is here discussed, is a paper test covering all of the significant technical and related information as taught in junior- and senior-high-school woodwork courses, upon which substantial agreement was found.

The method used in determining this significant material was as follows: First, a large amount of material was collected, consisting of courses of study, woodworking textbooks of wide adoption, national and state surveys, special references, and books on trade analysis. The data covered the woodworking field in the large city, the medium-sized city, the small city, and the consolidated district.

Second, a chart was then laid out, based on an analysis of woodwork in its various phases as taught in junior and senior high school. In the main the headings for classifying items was adapted from C. A. Bowman's "Graphic Aids in Occupational Analysis." Since standards of attainment were set up in a large number of courses, it was deemed advisable to add these standards to the chart. The analysis was thus made under three headings:

I. *Skills*—Dealing with the product.
   1. Processes.
   2. Types of work done.
      a) Projects.

[1]Nash-Van Duzee Standard Tests in Woodwork, Scale A, 1927, The Bruce Publishing Company, Milwaukee, Wis.

b) Problems.
c) Jobs.
d) Constructions.

II. *Related Information.*
1. Technical.
a) Mathematics.
b) Drawing.
c) Trade Judgment.
2. Science.
3. Trade Materials.
4. Safety Measures.
5. Care of Tools and Equipment.
6. Trade Terms.

III. *Standards of Attainment.*
1. Specific Skills and Standards of Attainment.
2. Specific Knowledge the Pupil Should Possess.
3. Specific Attitudes the Pupil Should Attain.

The courses, textbooks, references, etc., were then worked over carefully and, as items in the content were encountered, they were tabulated under the proper heading. For instance, in checking over a course of study, when mention was made of estimating lumber, that item was entered under the heading of trade mathematics. If mention was made of a tool, it was listed under tools and equipment. If mention was made of a joint, it was listed under constructions. Under materials, woods were studied as to structure, growth, transportation, shrinkage, weight, properties, grain, character, milling, quarter-sawing, seasoning, terms and measurement, grading, classification, and uses of waste. Under abilities in certain school grades were listed such abilities as sharpening a plane blade, squaring stock to $\frac{1}{16}$th of an inch, distinguishing four kinds of woods. These tabulations provided a classification of content covering the woodwork field.

The third step was to learn the common content of woodwork courses. This was accomplished by checking carefully the various courses of study and by making a frequency tabulation on the chart. Where processes were mentioned, such as sawing parallel to the grain, a check was placed against that item on the chart. The check was so made that it showed the grade or grades where this material was taught. Where a mortise-and-tenon joint was mentioned in a course in a certain grade, that item was so checked on the chart. This process of tabulation was continued until further tabulations were merely repetitions and no significant further information was obtained.

The analysis and checking as to frequency being done, the writers were then in possession of authentic information as to the significant material upon which there is common agreement among representative schools.

The content of the test was thus tentatively selected. Various technics capable of use in objective testing were then carefully studied, and the ones which were deemed best suited to the material selected were used. Questions were then formulated, and very little of the selected material was omitted because it did not admit of being objectively tested. The test was then tried out on several hundred boys, and on the basis of several tryouts, refinements were made and the technic was modified where it seemed necessary. Questions which showed no discriminative power were omitted.

This in brief is the technic which was employed and out of which developed the present form of the woodwork test. It will be seen at a glance that the test is not based on a local situation, that the standards were not arbitrarily set by the authors, and that the test itself has been submitted to the usual scientific procedure employed in the construction of any reliable standard test.

The test which is designated Scale A, is divided into four parts:

Part I consists of 60 true-and-false statements and 42 multiple statements; it tests the pupil's information relative to the processes and methods used in woodwork; the use, adjustment, and care of basic hand and machine tools; important safety measures to be employed. It also tests the pupil's knowledge of supplies used in woodwork, their classification, use, and method of purchase; it tests the boy's knowledge of wood constructions and the mathematics involved in estimating lumber bills. The pupil's trade judgment is tested in the selection of materials and the selection and use of tools.

Part II consists of a number of diagrams of joints commonly used in woodwork. The pupil's knowledge of these joints is tested in three ways: first, by the ability to recognize the correct names of joints; second, by the ability to detect incomplete drawings of constructions and indicate graphically the completed joints; third, by the ability to detect wrong constructions and to make proper corrections.

Part III consists of an incomplete drawing of a simple wood block and tests the pupil's basic understanding of drawings as to placement of views, methods of representing shapes in shop drawings, and the ability to complete a third view, two others being given. It also tests the boy's ability to interpret a drawing in order to secure the information needed by a woodworker to do a job.

Part IV consists of what is known as a matching test and tests the pupil's knowledge of such procedures as squaring-up stock and finishing work, and also the selection of tools necessary to do various processes. It also tests ability to recognize the various parts of a plane, which are important from the standpoint of care, adjustment, and use.

The test makes use of the best accepted methods and devices so that it is easy to administer. The directions are clear and simple, and are printed on the pupil's blanks so that the examiner needs only to read the initial directions, start the examination, preserve order, and call a time limit at the end of Part I and Part IV. The scoring is objective, simple, and expeditious. Experience shows that the test can be given within a 45-minute class period, thus making it possible to apply it to any class without interfering with the regular program of the average school.

The shop teacher who is unacquainted with testing may ask the uses of such a standard test: Briefly, it has the same value as any reliable standard test. It furnishes the teacher and the supervisor with an objective measure whereby they can compare the work of the various woodwork classes. The supervisor particularly can compare the work of his pupils and teachers with the work of teachers and pupils in other schools. This is certainly as desirable in woodwork as it is in English or mathematics.

In order to use his time with economy, the teacher should ascertain what the pupils really know at the beginning of the semester's work and thus end the wasteful classroom procedure of teaching things which pupils already know, with a consequent loss of time that might have been spent on things the pupils do not know.

The need of such an inventory test is still further emphasized in woodwork—indeed in all industrial-arts work—through the fact that new students entering from other schools have had different grade exposures in industrial-arts work.

Further such an initial measurement of the group together with a re-test at the end of the semester enables the teacher to objectively determine the actual progress of his class during the semester. It is extremely desirable and good teaching practice to allow each pupil to plot his initial and succeeding performances and thus use an effectual motivation in the learning process. Since the norms extend through junior- and senior-high-school woodwork, a pupil's record may be kept not only showing each semester's progress but also his progress from grade to grade, as he continues his woodwork.

The test is so organized that it has diagnostic value. Let it be clearly understood that the authors do not claim that this test is in the strictest sense of the term a diagnostic test. It is a fact, however, that it has a general diagnostic value. For example: Parts II, III, and IV deal with three definite phases

of woodwork. Norms are in preparation on each part of the test and will shortly be available. The teacher who uses the test will be thus enabled to immediately discover if these particular phases of woodwork have been slighted in his instruction or if the pupils have failed to get some particular phase of the work for other reasons which should at once be determined.

The test furnishes the teacher with a means for making his own marks more objective. Teacher judgment is subjective; a standard test will often indicate this fact where otherwise it would pass unnoticed. The test thus enables the pupil to get a fairer mark and places any teacher in a much more desirable position in assigning grades for this work.

The test enables both supervisor and teacher to determine standards of reasonable pupil performance in this phase of woodwork. Pupils falling below a reasonable standard of performance should not be allowed to pass. Norms are in preparation based not merely on median achievement but also on achievement at other levels. Such norms enable a teacher to make a more intelligent interpretation of the standards.

To mention one further use of the test: In the academic field, standard tests have played a large part in fostering and developing research studies. A study of the relative merits of two or more methods of instruction is only possible as objective tests are available to measure the relative progress made by experimental groups. Such studies are certainly desirable in the field of industrial arts. A test like that here described furnishes a medium for such studies in the particular field of woodwork.

The test is now being standardized; norms are being determined, based on a testing of at least 5000 pupils in grades 7 to 11 in representative schools throughout the country. As indicated previously, these norms will be for all four parts of the test and the total test. There will also be norms showing not only median achievement, but also achievement at other significant levels.

As stated, the test just described measures but one phase of woodwork, and will be supplemented by another, Scale B, which will measure shop performance. This phase of the work covered in Scale A—technical and related information—is coming to have increased significance. The authors feel that the test is not a perfect measure—no educational achievement test is that—but it is an initial attempt to measure some important elements of woodwork in a scientific manner.

HOW EXTENSIVE SHOULD A COURSE IN SHOP MATHEMATICS BE?

Prof. Thomas Diamond, University of Michigan

FOR SOME TIME arithmetic, as it is taught in our elementary and secondary schools, has been under grave suspicion. This suspicion has been developing quite consistently, and in some cases it has become a conviction that much of the material included under arithmetic is valueless when judged on the basis of its relationship to the everyday experiences in the lives of pupils.

As evidence of this tendency we have such authorities as Professor Schorling of the University of Michigan, and Professor Thorndike of Teachers' College, publishing textbooks in arithmetic in which they have endeavored to eliminate this criticism. Professor Reeves of Teachers' College also feels that the content of our arithmetic courses could be revised with profit to the pupils. In an address before the Mathematics Club of Grand Rapids, in December, 1926, Dr. Reeves said: "There is too much deadwood in our arithmetic. . . . . pupils in a junior high school are asked to perform operations that only highly trained technical workers will need in after life . . . . . the kind of dividends taught in school are entirely different from the dividends we are interested in in everyday life."[1] Dr. Reeves went on to urge the need for more attention being placed upon the fundamentals, and the elimination of the arithmetical puzzles which seem to have become so popular.

It should be noted that these authorities are not concerned with preparing the pupils for a specific vocation. They are interested in general education, but they are convinced that the subject matter used in the field of general education should be closely related to the experiences of the pupils.

If this is true in general education, then it ought to be true in vocational education. The primary purpose in vocational education is the preparation of the pupil for more effective participation in the activities of some occupation. Therefore, whatever subject matter is used in attaining this purpose should be judged by the directness with which it is related to the occupation to which the pupil is pointed. When a curriculum is being prepared for the purpose of training persons for an occupation, that occupation should be analyzed and only those parts selected for the course which are of specific value in it. As an illustration of this, the curriculum that an individual would follow in preparing to be a carpenter would be made up exclusively of material which is of definite value in the carpenter trade. The fact that chipping or filing might be of value to the pupil in caring for his automobile would not justify its inclusion in his course.

While the thought expressed in the illustration given is generally accepted in regard to the manipulative processes taught in our vocational classes, it is feared that those responsible for the selection of the arithmetic necessary in an occupation have been guided in their choice more by tradition than by the requirements of the case. As a result of this we find that frequently teachers of arithmetic or shop mathematics in our vocational schools are guilty of creating the conditions deplored by Professor Reeves. In other words, they are likely to present problems which are mere puzzles, or they teach principles and processes which the pupil may use some day provided he stays in the job long enough, receives sufficient promotion, and happens to encounter problems which involve them.

Since the immediate aim of vocational education is to prepare people for occupations, and since the content of the curriculum should contain only those things which bring the pupil nearer his objective, it was believed that a more effective course of study in arithmetic could be built up if reliable data were available on the extent to which workers use arithmetic on the job. With the idea of securing such data a study was made of a large number of workers of ages varying from 16 to 45, and from a number of different occupations. The workers were reached through the part-time and evening schools of Michigan, and any merit attached to the results obtained must be attributed to the enthusiasm of the teachers and directors of these schools.

Those who cooperated were asked to avoid placing the questions before their classes in the form of an assignment. It was suggested that they ask for the cooperation of the

[1]Grand Rapids Herald, Dec. 9, 1926.

students in solving a problem in which they—the teachers—were interested. No one was required to reply, and it was made clear that failure to answer would not affect one's standing in the class. In order that the students would not receive the impression that it was necessary to justify the teaching of arithmetic to please the teacher of arithmetic, only those students who were not taking arithmetic or shop mathematics were asked to submit replies.

The students were asked to observe very closely for one week and to take note of any cases in which it became necessary for them to use arithmetic in their work. If such occasions arose, they were to note the specific example used. At the end of the week, time was taken out of a class period to transfer the information collected to suitable blank forms.

It was believed that some of the workers might use some operations in arithmetic which had become so nearly automatic that they would not classify them as belonging in the field of arithmetic. In order to eliminate this condition as far as possible, the teacher asked such questions as: Did you measure anything? Did you make change? Did you figure your time or your pay? To further eliminate the possibility of the student using his imagination only, those reports were considered in which specific illustrations of the examples used were given.

Table I shows the different occupations from which reports were received and the number reporting from each. It will be noted that 86 different occupations are represented in the report, and that the numbers in each varies from one, in 23 cases, to 133 employed as common laborers. Both men and women are included, and the range of occupation varies from unskilled up through the several stages of partially skilled to the most highly skilled jobs in different trades. This wide range, both in number and in types of occupations, provides a fair cross section of the group employed in our industries, stores, and offices, and indicates quite distinctly the lines of work into which the products of our vocational classes go.

TABLE I—OCCUPATIONS REPRESENTED

Occupation	Totals Using	Not Using	Occupation	Totals Using	Not Using
General Labor	56	98	Patternmaker	2	..
Factory Work	75	41	Sander	..	2
Clerk in Store	83	19	Gluer	1	2
Machine Operator	65	32	Butcher	2	1
Housework	30	52	Milkman	1	1
Knitting Mill	36	3	Caddy	..	2
Office Work	29	15	Shoe Repairing	..	2
Messenger	11	22	Multigraph Operator	2	..
Machinist	51	16	Lathing	2	..
Carpenter	17	10	Beltmaker	2	..
Toolmaker	23	5	Mason	1	1
Setting Up Pins	8	6	Nickel Plater	1	..
Waiter	6	5	Laundryman	..	1
Stenographer	7	5	Mailman	..	2
Errand Boy	3	10	Engraver	1	..
Auto Trimmer	7	5	Glazing	..	1
Electrician	18	5	Shining Shoes	1	..
Auto Assembler	7	6	Veneering	1	..
Printer	30	8	Blue printing	..	1
Baker	3	4	Hand Carving	1	..
Foundry Work	3	5	Tinner	1	..
Farm	4	7	Blacksmith	1	..
Bookkeeper	6	1	Tool Grinder	1	..
Laundry	5	..	Bricklayer	3	..
Wood Finisher	4	4	Auto Woodworker	2	3
Auto Mechanic	12	7	Cook	1	..
Motor Repairer	2	3	Sheet Metal	2	1
Care of Children	..	4	Band Sawyer	..	1
Candy Factory	4	..	Duco Polisher	..	1
Cabinetmaking	8	2	Truck Driver	2	2
Garage Work	1	3	Secretary	1	1
Beauty Parlor	2	1	Canvasser	1	1
Oil Station	2	1	Cafeteria	..	1
Draftsman	12	..	Telephone Repair	1	..
Upholsterer	3	2	Meter Reader	1	..
Riveter	4	1	Embalmer	1	..
Nurse	3	..	Barber	1	..
Welder	3	2	Plumber	4	1
Painter	5	3	Interior Decorator	1	..
Handcarver	3	..	Inspector	7	2
Railroad	..	2	Foreman	1	3
Tailor	2	..	Bookbinder	2	..
Tinsmith	2	..			
Auto Marker	2	..			
Total reporting arithmetic					515
Total reporting none					396
Grand Total					911

It is interesting to note that in the 911 replies received, 515 reported having used arithmetic in one form or another, while 396 reported that they had used none. Thus we see that 42.03 per cent of our workers do not use arithmetic in their work to the extent that they are conscious of it. Not only is this true, but many of those who claim that they use it do so only to a very limited extent. This fact is brought out in the following table.

Table II gives a statement of the various types of arithmetical problems used by those reporting, as well as of the frequency with which each was used.

In this table a distinction has been made between the younger workers and those who are more mature. The former were reached through the part-time schools, the latter through the evening school. The two groups are shown in separate columns, each with its appropriate heading.

TABLE II—PROBLEMS REPORTED

Type Problem	Times Reported P. Time	Evening	Total
Addition	135	203	338
Keeping track of time	177	65	242
Counting	116	40	156
Subtraction	88	149	237
Multiplication	84	168	252
Division	59	139	198
Making Change	68	19	87
Measuring (Rule)	16	71	87
Figuring Pay and Bonus	23	44	67
Cost of Goods	19	20	39
Commercial Fractions	8	24	32
Adding up Bills	15	...	15
Percentage	3	7	10
Making out Money Order	10	...	10
Reading Micrometer	1	17	18
Decimals	3	14	17
Weighing (lbs.-ozs.)	5	5	10
Measuring (Gas and Oil)	6	1	7
Proportion	3	13	16
Check Cash	6	1	7
Measure Areas	...	8	8
Make out Bill	4	...	4
Adding Machine	...	5	5
Interest on Deposits	...	3	3
Interest on Note	...	3	3
Printer's Measure	...	2	2
Square Root	...	7	7
Trigonometry (3rd Side)	...	2	2
Use of Pi	...	2	2
Lumber Measure	1	2	3
Make out Receipt	1	...	1
Make out Check	1	...	1
Interest on Money Borrowed	...	1	1
Balancing Accounts	...	1	1
Speed of Pulleys	...	1	1
Find Chord	...	1	1
Pitch Diameter	...	1	1
Bevel Gearing	...	1	1
Taper Problems	...	1	1
Size of Taps	...	1	1
Comptometer	...	1	1

When we examine this table we begin to wonder if our present practice is justified on the basis of the need in the occupations into which our pupils go. It is obvious that there is no indication of a need for algebra or geometry, and yet, time after time, we find both of these masquerading in our vocational classes as "shop mathematics." It is true that any one wishing to justify the teaching of algebra or geometry might be able to point to cases where they would be helpful to the worker, but these cases seldom appear and, when they do appear, only certain individuals are permitted to deal with them. The truth of this is borne out by the fact that not once during a full working week did either of these appear in the experience of 911 workers.

We find also that only two individuals found it necessary to determine the circumference of a circle from the diameter, and one other individual was confronted with a situation in which he was called upon to calculate the speeds of pulleys. In face of these conditions the suggestion comes to us that perhaps the use of *pi* and the calculation of speeds of pulleys occupy important places in our shop mathematics textbooks which are far out of proportion to their relative importance.

Similar illustrations could be drawn which might cause us to question whether or not we have confined our subject matter for vocational students to the material necessary or desirable in the occupations.

Another fact worth noting is that in most cases where division was used, the remainder was ignored and the answer given in whole numbers. For example, in cutting up material a worker tries to get as many usable pieces out of each board,

sheet, or plate, as possible. If he gets 4 out of one piece and is just short of enough material to make 5, the answer to the problem is 4, not 4½ or 4¾. Teachers of arithmetic would do well to note this as, in many cases, the individual who goes from school to factory and figures a problem out to so many units and a fraction appears ridiculous to his fellows and becomes a source of amusement in the shop.

The problems submitted by those who reported emphasized still another factor which should be of interest to teachers. Without exception, every fraction used belonged to those in use in the everyday job of measuring with a common rule or micrometer, 64ths, 32nds, 16ths, 8ths, 4ths, 10ths, 100ths, and 1000ths. If these fractions constitute the full vocabulary of the worker so far as fractions are concerned, it would seem to be unwise to extend this to include such terms as $2\frac{2}{37}$ when we have actual evidence that he never by any chance uses the expression on the job.

There is popular belief abroad in the field of vocational education that an unskilled or semiskilled worker rarely finds himself in a job where a knowledge of arithmetic is a necessity, whereas arithmetic is an absolute necessity for a worker in any of the skilled trades. This belief is not supported by the evidence obtained, as the following table shows that there is little difference between the number who do use it and the number who do not in the two types of employment.

TABLE III—COMPARISON OF SKILLED AND UNSKILLED WORKERS

Occupation	No. Using Arith.	No. Not Using
Skilled Trades		
Machinist	16	11
Toolmaker	7	5
Carpenter	17	6
Printer	4	6
Cabinetmaker	4	4
Painter	3	3
Baker	3	4
Totals	54	39
Per cent	58	42
Unskilled or Semiskilled		
General Labor	46	87
Factory Work	75	41
Machine Operator	57	31
Totals	178	159
Per cent	53	47

Not only is there little difference between the skilled and the unskilled or semiskilled groups in regard to the numbers who use arithmetic, but the data secured shows that, with the following few exceptions, neither group used more than the four fundamentals.

TABLE IV—TYPES OF PROBLEMS BEYOND THE FOUR FUNDAMENTALS REPORTED BY THE GROUPS CONSIDERED IN TABLE III

Types of Problems	Number Using	Per cent of Total Reporting
Common Fractions	25	2.7
Percentage	10	1.09
Decimals	9	.98
Proportion	7	.75
Square Root	2	.21
Trigonometry (3rd side)	2	.21
Gear Problems	2	.21
Use of Pi	1	.1
Pulley Speeds	1	.1
Taper Problems	1	.1
Find Chord	1	.1

It would appear from the data given above that there is little justification for the teaching of arithmetic as a part of the training provided for certain types of workers, and there is no justification for including it in the training provided for others. If vocational training means training which specifically prepares a person to more effectively perform the duties attached to some occupation, then only those things which function in the occupational life of the worker should be taught. It is true that arithmetic may have other values which warrant its inclusion in the curricula of our vocational schools, but, from the standpoint of its vocational value, it will be difficult to justify any extensive course.

Table II shows that less than 25 per cent of those reporting actually use addition. If we add to this the number who add when they keep track of their time or when they count we are likely to find that the teaching of addition to workers in general may be justified. The same might be said to a lesser extent of the other three fundamentals. As less than three per cent use common fractions on the job it would seem to be undesirable to include them as a part of a course designed for all workers. This does not mean that some workers will not need fractions. Rather does it mean that the few who do need them will get them when they have use for them.

There are a number of "shop mathematics" textbooks on the market which are supposed to provide a type of arithmetic which is peculiarly adapted to the needs of the worker. Most of these texts stress "speeds of pulleys," "circumferences of circles," "gear problems," "lumber measure," and similar more or less difficult problems connected with the tools and materials some workers use. When we consult Table IV we find that only one individual reported figuring the speeds of pulleys, two individuals claimed to have used *pi*, two individuals worked gear problems, and three individuals worked problems in board measure. Now, there is no question about the interest of many workers in such problems, but the same group would be just as interested in a well-arranged series of puzzles. If we are attempting to provide an interesting pastime, then these texts are very much worth while, but it seems a mistake to label such work as vocational training.

An effort has been made to show that, so far as preparing our young workers for their job is concerned, little emphasis need be put upon arithmetic beyond the four fundamentals. It may be interesting to some to discover what emphasis is actually being placed upon this subject.

The following data, taken from a study made by the writer, of the teachers of academic and related subjects in the vocational schools of Michigan, may be enlightening:

TABLE VI—THE NUMBER AND PERCENTAGE TEACHING EACH SUBJECT AND THE NUMBER OF HOURS PER WEEK DEVOTED TO EACH

Subjects	Teachers Number	Teachers Per cent	Hours Number	Hours Per cent
Arithmetic	39	32.5	253	27.3
English	36	29.0	276	29.8
Civics	23	18.6	139	15.0
Home Economics	10	8.0	106	11.3
Commercial Work	8	6.4	103	11.1
Vocational Information	3	2.3	13	1.1
Economics	2	1.6	9	.8
Shop Science	1	.8	21	2.2
Social Science	1	.8	15	1.4
Total	123		935	

It will be noted that arithmetic received the greatest emphasis in regard to the number of teachers teaching it and stands second in regard to the number of hours per week spent on it.

It is believed that it is of primary importance to send our young workers out into industry with a reasonable attitude toward certain questions in economics and social science. We have tried to show that arithmetic is relatively unimportant and yet there are thirteen times more teachers of arithmetic than of these subjects.

The reason for this misplaced emphasis may be explained by the following table which shows the sources from which the teachers of academic and related work in our vocational work are recruited.

TABLE V—OCCUPATIONS OF TEACHERS BEFORE ENTERING VOCATIONAL FIELD

Occupation	Teachers Number	Teachers Per cent
Grade-school Teacher	24	40.7
High-school Teacher	12	20.4
Normal-school Teacher	2	3.4
Special Teacher	3	5.1
Student	7	11.8
Work other than Teaching	11	18.6

A total of 64.5 per cent of the teachers came from the academic field in the public schools. It was found that 81 per cent of the teachers had never had any industrial experience or contact with industry. These facts indicate that the teachers of academic work in our vocational schools are

not likely to have a very comprehensive knowledge of the relative value of different subjects to a young worker. They are not familiar with the environment of industry and consequently cannot be expected to prepare a curriculum that will fit into the needs of those who must live in it.

Summary

1. About 45 per cent of our workers do not use arithmetic in their work.
2. Less than 24 per cent of all workers use addition in their work.
3. Less than 17 per cent of all workers use subtraction in their work.
4. Less than 17 per cent of all workers use multiplication in their work.
5. Less than 12 per cent of all workers use division in their work.
6. Less than 3 per cent of all workers use common fractions in their work.
7. All other problems reported were used by fewer than 2 per cent of the workers, and a number of them were used by as few as one tenth of one per cent.
8. There seems to be little difference between skilled, semiskilled, and unskilled workers in regard to the frequency with which arithmetic is used.
9. In spite of these conditions more emphasis is placed upon arithmetic in our vocational schools than on any other academic subject.

In view of these facts it seems desirable for us to reflect on what we are doing in our arithmetic classes. Should our courses of study be based entirely on the four fundamentals? Since the time we have at our disposal for this part of the work is so short, should we not concentrate on these until they are mastered? When this has been done might it not be better for us to leave the more advanced phases of arithmetic and spend our time on something that will be beneficial to all rather than to the small group who may use the advanced problems usually taught?

The only legitimate reason for the existence of vocational education is that it prepares people for the vocations they are either in or are hoping to enter. If we do not take heed and bring our subject matter more into harmony with the needs of the occupation, it is feared that this reason will cease to exist.

SCHOOL PRINTING IN THE UNITED STATES

F. C. Lampe, Chicago, Ill.

(Continued from June)

Public Schools Start Vocational Courses

That a nation's commercial greatness lies in its skilled man power as well as in its wealth of raw materials no one will deny. Progress in the commercial greatness of a country comes only through the combination of the development and utilization of both man power and materials.

The necessity for keeping up the man power of the United States in the various skilled occupations caused considerable interest, about the beginning of the present century, in apprentice training and in all forms of vocational education. The breakdown of apprenticeship and the entire lack of facilities for replacing the passing generation of skilled workers received serious consideration about this time, by some of the biggest minds both in the industrial and educational fields. The successes of vocational education in Germany, France, and other European countries naturally receive attention in the United States. A number of American commissions visited the principal European countries to study their systems of training apprentices. About this time, too, the interests of educators and industrial leaders was joined in the National Society for the Promotion of Industrial Education. And this organization, more than any other, influenced congress in passing legislation some years later, providing for financial aid to the state in undertaking and continuing a program of vocational training.

While the period from 1875-1910 saw the development of many private and some public undertakings in vocational education, there is no question but that the movement has made more progress since the passage of the Smith-Hughes law than it made during the previous thirty-five years. In the following paragraphs, there are brief accounts of a few of the schools in which printing has been taught from the vocational or trade-preparatory standpoint. It will be noted that the earliest of these schools began to offer the subjects as a trade subject only a little more than twenty years ago.

Printing was first taught in the Rahway, N. J., Reformatory in 1905. Neils Hanson was the first instructor. The classes numbered about 12 in the beginning, but now 30 boys are instructed. Superintendent Frank Moore says the boys take an interest in printing and later work at the trade.

While one would think that Philadelphia, the home of Benjamin Franklin, should be found among the earliest to put a printing course in the public schools, it was not until the autumn of 1906 that the Trade School for Boys was opened. Dr. M. G. Brumbaugh, then superintendent, had a printing outfit installed, and James M. Harvey was the first instructor. Twenty boys were enrolled, and the equipment was ample for that group. On February 1, 1919, the trade school was merged with the high-school system, and the printshop was taken over by the Board of Public Education as its printing plant for the production of routine forms, etc. Instruction in the subject was discontinued because the enrollment in the classes had been declining for some time.

In the fall of 1911 printing was introduced in one elementary school, to serve seventh- and eighth-grade boys. The instructor was the teacher of elementary industrial arts. There are now seven elementary schools that offer printing, and one school for special classes. From 24 to 30 pupils are in the classes.

Printing was first offered in the McCall School in the spring of 1925, after conferences with representatives of Philadelphia Typothetae and the typographical union. The original equipment, valued at about $35,000, was provided by the typothetae, and since classes were begun additional equipment has been installed. There are a number of printing instructors in this school; E. C. Vosburg, Jr., has day and evening classes, and F. S. Henry has evening groups only. Men in the trade are encouraged to attend part-time and evening extension classes. The size of classes are 15 to 20.

In 1909 New York City first undertook the study of printing; Dr. William H. Maxwell, then superintendent of schools, recommended to the board of education that a course be given in the Vocational School for Boys. There are now 24 schools in which printing is successfully taught, the classes varying from 20 to 30.

Dr. Addison B. Poland, then superintendent, put in a course of printing in the Boys' Vocational School, Newark, N. J., in 1911, with Frank K. Phillips as instructor. Eleven schools now have a course in printing, with classes of 20 to 25.

Atlantic City, N. J., first put in a course of printing in September, 1912, James A. Gaffney being the first instructor, with a class of 8 students. There are now 36 in the class. Superintendent Frank E. Flower claims that all students secure positions in the trade when they leave school.

Supervisor J. A. Chamberlain, Washington, D. C., gives September, 1913, as the date when the printshop was first opened in the "O Street Vocational School," which was a school for colored boys. The first teacher of printing was C. W. Chase. In 1918 the printshop was moved to the Cardozo Vocational School for boys and in 1923 again moved to the Phelps School, where it now is located. At present there are thirteen printshops in the school system—four in senior high schools, six in junior high schools, and three in vocational schools. Classes vary from 12 to 20 pupils each. In the newer schools where printing started on an equality with other manual-arts subjects, the enrollment is much higher than in schools where it is a newcomer.

Printing was first instituted in the Boys' Vocational School, Albany, N. Y., in 1914, with Charles Whittemore as instructor. A group of ten boys composed the first class. Since then the equipment has been added to and the school now accommodates twenty students. A monthly magazine is published and the boys do a great share of the printing for the city schools. Night classes in typography were started for indentured apprentices in 1922, the program for which was planned with the cooperation of a committee of local printers. In 1921 part-time classes were instituted, Charles Dunigan being the teacher.

A number of Masons of Fort Worth, Texas, in 1921 organized a private school of printing, by individual subscriptions, in the Masonic Home of that town so that suitable boys might receive practical instruction and be self-supporting when they left the school. The school is supported by the Masons of Texas. The first instructor was Lindsey H. McCans. The boys serve from two to four years, or until they graduate from high school. The classes are from 12 to 30. Training is given in composition, imposition, platen and cylinder presswork, small bindery work, and linotype manipulation. Manager Fred W. Miller says he has no trouble in placing the boys in good positions when they have received all the training the school is able to give them.

In 1922 printing was introduced as a trade subject in the School for the Deaf and Blind, Gooding, Idaho. S. G. Clover was the first instructor. An up-to-date printshop is in this school, with a Model 14 Linotype. Superintendent C. J. Settles says that linotype operating, presswork, etc., are the best lines of work for deaf boys, who are placed in positions in newspaper offices at good wages.

In 1922 a printing department was established in the North Dakota State School of Science, Wahpeton, N. Dak. Mr. Satterlee of Minneapolis was the first instructor and he still holds that position. The department started with practically no students, but since 1924 the school has been compelled to decline to register some students because it has been impossible to handle them effectively. The department now has three linotypes, a cylinder press, two job presses, cutters, staplers, and all other necessary equipment, as well as an adequate variety of type faces for hand composition. Practical work is given the students, preparing them for the trade. The classes do not exceed fifteen, and special linotype instruction is provided during the winter for night work.

The Deaf School at Devils Lake, N. Dak., has a complete printing plant, which has been in operation for some time with very satisfactory results. The Fargo, N. Dak., high school has a manual-training printshop with equipment for hand composition. The University High School at Grand Forks has similar equipment. The latter schools do not prepare for the trade, but teach printing for its educational value.

The First to Advocate School Printing

William H. French, who was secretary of Barnhart Brothers & Spindler in 1887, was the first to consistently urge printing for schools. It was he who was largely responsible for the courses opened in Indianapolis, Ind., the first city to put in printing in the public schools. Mr. French ever since that time has urged school people to put printing into their schools.

A survey shows that the greatest development in school printing has taken place within the past ten or fifteen years. And the school printshop has from time to time become larger and better equipped in every way. The number of students taking the course is greater now than formerly; in some schools printing is a required study, while in the majority it is elective.

The junior high school in many cities offers a course of printing. It is claimed to be the ideal study in this type of school, and while only a very small percentage of the students later follow printing as a gainful occupation, it is a great help no matter what line of endeavor may be selected by them.

Where printing is taught, 96 per cent of the school papers are produced by the school printshop, the student body preparing the material that goes into it. The art department also takes a hand in the publication, furnishing linoleum-block and other illustrations.

This highly developed state of correlation of the various school departments with the printshops did not exist when printing was first introduced into the schools. In the early days of school printing the equipment was indeed meager, consisting in most instances of a hand press, a few small fonts of body and job type and the necessary working materials. The cost of such an outfit in those days was considerably below $100. But that was sufficient as an experiment. From such small beginnings printing has now become one of the most popular shop courses.

The school printshop equipment installed in recent years is more in keeping with the regular commercial establishments and provides instruction not only in typography, but in presswork and in the operation of various kinds of automatic machinery used in the printing trade. It is assumed that students with a knowledge of the uses and mechanical manipulations of such machines will have a better opportunity for success when they leave school.

In a number of schools a course of bookbinding has been added to that of printing, enabling the students to produce pamphlets and books in their entirety. In this department the schoolbooks are rebound and again made useful. In some schools where bookbinding is taught as a regular subject, leather artwork is also undertaken. The Colorado State Teachers College at Greeley has such a course, which recently has been made a required subject.

(To be continued.)

"A FRAME-UP ON THE 'AG' TEACHER"

J. Douglas Wilson, Los Angeles, California

ON SEPTEMBER 13, 1925, a certain portion of the school grounds of the Roosevelt High School in Los Angeles, was covered with a pile of dirt about ten feet high. On February 1, following, this dirt pile was gone and a 36 by 48 ft. lath house was standing there—a building that required over 2 miles of lath to enclose and 55 windows of various shapes and sizes! By June 30, 1926, when school closed, the lath-house interior was a bower of greenery. Such in a nutshell (or rather in a lath house) is the story of the "frame-up" on the agriculture teacher.

My Smith-Hughes carpentry class had the job of building this project assigned to it on the day school opened. I had previously arranged for and ordered all necessary materials, and these were on the grounds.

To start the ball rolling, while waiting for the teams to move the dirt, a temporary platform was erected nearby, on which the roof trusses, five in number, were built. These roof trusses made a fine problem in layout work as the radius of the curved roof is over 32 ft. This part of the job lasted about ten school days at the end of which our ground was leveled off in splendid shape ready for the actual staking out of the building.

This last was not a particularly hard job for the boys, as many of them had had previous experience in that kind of work, and the building was rectangular in shape. After the lines were all properly located the students had the job of digging 5 holes about 3 ft. square and 4 ft. deep, which were required because of some filled dirt and because the foundation piers, 12 in number, must rest on solid ground. Each pier was about 2 ft. square.

Forms were made for each pier, properly braced and prepared for the concrete. A hand-power mixer was used, the strong right arms of fourteen boys in the class doing the job in short order. I probably increased their appetite somewhat in reminding them that concrete forms are somewhat like ice cream; that is, if ice cream is made in a round container then the shape of the cream will be round; if made in a square container it will be square; likewise the concrete in the forms will be the exact shape of the forms and, therefore, the forms should be square, plumb, and level.

With the concrete out of the way (or rather in the ground) we were able to proceed with the framing of the walls. A 6 by 6-in. post was erected on each pier and a framework of 2 by 3-in. stock was built between posts. Each post was set on a steel dowel which had been cast into the concrete so that it could not be shifted off the pier.

While the roof trusses were of good size and rather awkward to handle, they were raised to place with but little effort, due to the number of students in the class.

The placing of the purlins, which are the horizontal pieces in the roof to which the lath and sheathing are nailed, required a lot of climbing on the part of the boys in order to get them

PROGRESS VIEWS IN THE CONSTRUCTION OF THE LATH HOUSE BUILT BY THE CARPENTRY CLASS AT THE ROOSEVELT HIGH SCHOOL, LOS ANGELES, CALIF., UNDER THE DIRECTION OF MR. J. DOUGLAS WILSON.

to place. First, purlin supports of 1 by 6-in. stock were nailed to each truss, the top end being notched to receive the 2 by 6-in. purlin stock. These supports were kept in a straight line by nailing on the end ones first and then stretching a chalk line from building end to building end.

Christmas vacation came along about this time so we knocked off work for a couple of weeks.

On the first day of the new year we nailed the sheathing stock over the classroom. Due to the curve of the roof, this stock was ordered 24 ft. long, so as to avoid end joints, the boards bending to place with but little trouble. The hardest part of this job was to keep from sliding off the roof, as the sheathing was smooth and the curve of the roof was rather steep at the bottom. The same difficulty was encountered when laying the composition roofing, it being necessary to tie a rope to one of the boys so that he would not slip off the roof while nailing the lower edge of the paper.

The redwood siding and lath were put on at the same time, each boy being given a chance to do both kinds of work. Not ordinary house lath were used but redwood strips ⅜ in. thick and 2 in. wide, which were of sufficient strength to permit the students to work on the top of them while nailing on the roof strips. Care was exercised to see that the spaces between the lath were parallel at all places in order to give the finished job a workmanlike appearance. In like manner, when putting on the side-wall strips, the plumb was used quite often so that all these lath would be plumb and parallel.

When fitting and fastening on the siding, the chalk line was used to keep the stock straight and parallel. Incidentally it is this part of the exterior finish of any building that "tells the world" almost at a glance what kind of a mechanic did the job.

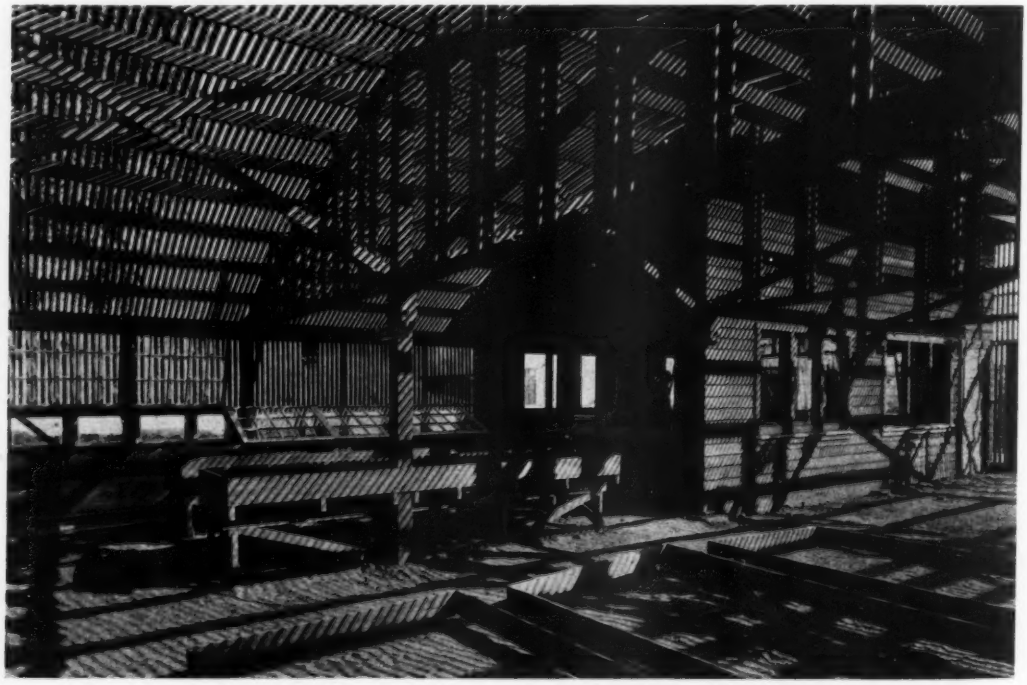
The interior of the classroom has about 400 sq. ft. of cement floor. Even though that work is not primarily a carpenter's job we determined we would complete the building ourselves. We "parked" the one-half-bag concrete mixer on the bank and then made a V-shaped trough down which the concrete was poured directly from the mixer. Some of the boys wheeled the rock, others the sand, and one or two constituted themselves as engineers of the mixer. The rest of the class took care of the concrete as fast as it was delivered down the chute.

By the use of guide strips, the floor was made with a drain to it so that the water will flow directly to the sump pit and from there to the sewer. With the floor finished we felt as though the hardest part of our job was done. We still had to fit the 55 windows and make the tables and sand benches.

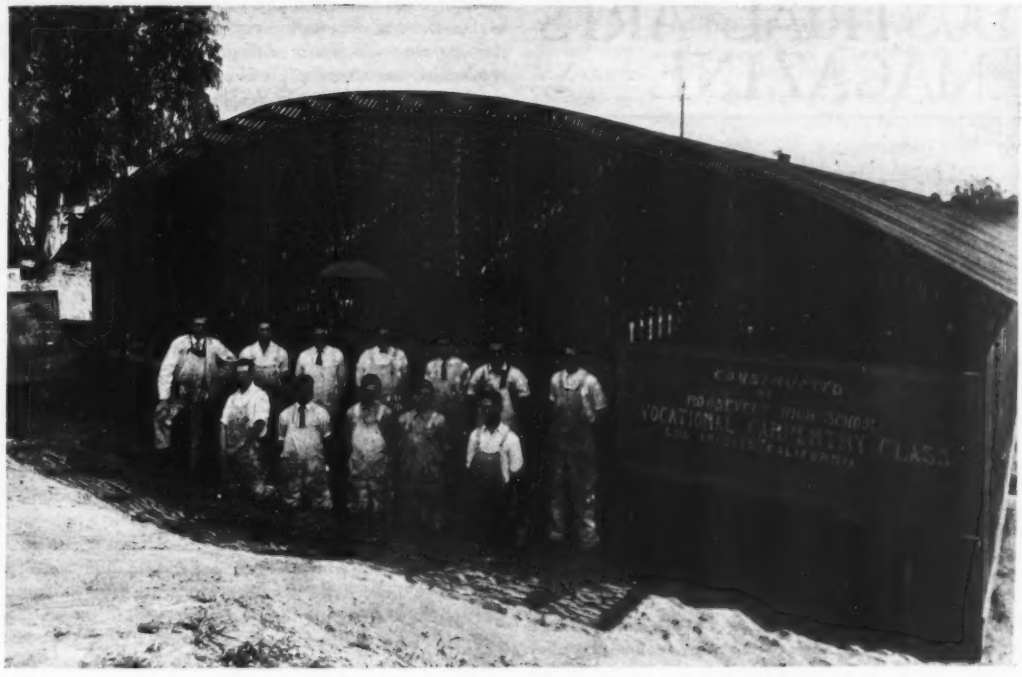
It would be hard to find a better workshop than the interior of this lath house; lots of air and light. We completed the equipment first and left the windows to the very last so as to avoid breaking any glass when handling the long lengths of lumber. Eighteen of the windows were hinged at the bottom and this gave a number of the students splendid experience in this kind of work. The balance of the windows were fitted in fairly loose and then stops were nailed against them.

All during the construction period the agricultural classes had been planting seeds and hundreds of cuttings in any available ground so that when they actually took possession they soon transformed the interior into a bower of beauty. To make the process of watering his many plants an easy one, the agricultural instructor installed a ¾-in. perforated water pipe lengthwise through the center of the building. By turning on the faucet that controls this pipe, a fine spray can be sent all over the plants and nursery stock.

The day finally came when we could not find any more work to do and, frankly, we were loath to move out. But such is the life of the carpenter; when he gets a building in such shape that it is a convenient place to work or live in, it is time



INTERIOR OF THE LATH HOUSE BUILT BY THE CARPENTRY CLASS AT THE ROOSEVELT HIGH SCHOOL, LOS ANGELES, CALIF. THE PICTURE WAS TAKEN JUST BEFORE THE "AG" TEACHER AND HIS CLASS BEGAN TO HAUL IN EARTH AND PLANTS.



EXTERIOR VIEW OF THE LATH HOUSE AND THE CARPENTRY CLASS THAT BUILT IT.

for him to move on! And this we did. Moved away a hundred yards and began our next project which was a faculty garage to house twenty cars.

And when we moved out the "Ag" man moved in and the "frame-up" was complete; and it is still a question of who got the best deal, the boys who constructed the building or the boys who now use it. Anyway, everybody is satisfied and the project has proved to be of splendid educational possibilities, and will continue to be of service for a long time to come.

AN INTERESTING ALPHABET DESIGNED BY BEN HUNT AND ED W. HUNT.

INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn
Editors

THROWING THE MONKEY WRENCH

From the earliest known civilization, the desire to practice and reach the arts is evident. Then came the philosopher who insisted that since art is individual, it may not be taught. This was the first monkey wrench thrown into the apparently well-working art-education machine.

Reasonable of course! If imitation is not art, then imitation is not learning art and directed imitation is not teaching art. But the so-called teacher of art persisted in directing and demonstrating and explaining how art is performed, and no one but the philosopher objected. The monkey wrench did not stop the machine.

Then came the psychologist who insisted that art is emotional and not intellectual. Another monkey wrench struck the vitals of the art-education machine, for is it reasonable to suppose that emotions can be taught? No! Intellectual conceptions can be taught, but emotions must be caught. Emotion is a sort of contagion which may be caught from the inspirational soul by the temperamental soul, but cannot survive the methodical formality of the schoolroom. Again, the so-called teacher of art persisted in dealing with a mythical subject by a material method.

Things have now reached a pretty pass. The old art-education machine still turns out acres of so-called art to cover the walls of schoolroom and convention halls in spite of the philosopher and the psychologist who insist that all of this good paper and paint is wasted, excepting a scant bit here and there, which is pronounced entirely original and emotional in spite of the teacher's effort to the contrary.

We wonder if after all, that monkey wrench might not turn into a boomerang and through the indifference and ignorance of popular opinion swat the philosopher and the psychologist off the rostrum. We almost dare to hope that it will do so.

THE SCHOOL HARVEST

The school harvest is in process this month. Within a few days every grade and standard in the educational process will have passed on the production of a year to the next in order of development.

Individual teachers will for the most part be forgotten by the children whose interests they have fostered, yet the influence of the teachers who have been able to impress youth with unselfish ambition and integrity will persist.

Teaching must be a formalized, orderly procedure that becomes monotonous to the teacher who does not have and keep the great purpose of education at heart. The school product is never a finished product. Teachers may not see pupils leave their instruction with more than a start in the right direction.

At present there are in round numbers four million pupils in our secondary schools. The number of pupils in our secondary schools in proportion to our population is now about six times as great as in 1890.

This remarkable increase in enrollment has occurred at a time when the dollar has decreased in purchasing power and demands on the schools in the way of added subjects of instruction with expensive equipment have been made.

In the face of these obligations the schools have developed much in improved standards of study and teaching.

The behavior of this army of four million energetic youths is of great concern to every thoughtful citizen. Given every advantage of instruction and equipment; a program that seems to foresee and forestall every emergency and inconvenience; training that will insure ability to earn a living under known conditions; yet thought persists that unless a sense of obligation and responsibility is developed in children during their school experience the school harvest is a failure.

ORIENTATION

The tendency of secondary schools to ape the college in organization and methods is evident. Now comes a little evidence in reverse.

A certain college committee on educational policy submitted to the faculty for their consideration a unique course for freshmen.

It was called a course in "orientation." Orientation in this case was not a technical survey of the orient or of the occident, in order to establish astronomical or geographical relations in space. It was nothing so mysterious when explained in simpler language. When explained, that mysterious word "orientation" was nothing more or less than the college committee's way of saying that they thought the freshmen ought to be helped in the important matter of finding some definite study in college to which they could apply themselves with purpose and interest.

Some folks who are not well acquainted with freshmen in college believe that college students have a very definite purpose in life and are in college to prepare themselves for that purpose. This committee knew better. They suspicioned that of the million or more college students in our colleges many have no definite objective other than to be in college.

The content of this proposed course has not been given out by the committee but we have faith in a committee which could find a name so comprehensive.

Orientation! Finding yourself; vocational guidance; a new college course, but an established interest in the secondary schools. We are glad to note that the colleges are to follow the example set by the secondary schools and attempt to help the freshmen get their bearings. They need such help.

SUMMER VACATIONS

Every vocational and industrial-arts instructor will soon be making plans for the summer vacation. Some will hie themselves as far away from educational thoughts as it is possible to get and thoroughly enjoy a rest and change of scene. Others will pursue advanced studies in college summer sessions. Still others will enter industrial employment to either tide over a financial crisis or to secure first-hand information relative to industrial conditions as they really are.

The choice of a profitable manner to spend the summer vacation is a question which is not always decided by our desires. It may be necessary for some to meet certain responsibilities, while the natural selection would be an extended motor trip from coast to coast.

It is highly desirable, however, to get the most out of the summer months to equip us for a fresh start on the new school year. This might be accomplished by a complete rest, a course of study, or work in industry. It resolves itself to the individual and his circumstances to make the correct choice.

The person who varies his procedure from summer to summer, getting an all-around experience in advanced courses, industrial employment, and rest with congenial company is perhaps following the wisest plan. To do the same monotonous thing every summer is narrow and not conducive to the best results. We have some teachers who could profit more by industrial employment than by summer sessions at a university and vice versa.

THE OLD VERSUS THE NEW

The May 5 issue of the *American Machinist* carried the following editorial entitled, "Bunk About Old Machines," which is sure to interest all engaged in education in the metal trades:

"Of all the bunk that inflicts the human race perhaps the particular brand that glorifies the past at the expense of the present is the most pernicious. That there were great artists and workers in wood and metal in the past none will deny. But the average of workmanship was much lower than at present. Examine one of your old family heirlooms with the critical eye you use on present-day products and in nine cases out of ten you will find workmanship you would reject in your own shop.

"In a recent instance a visitor wanted parts for a lathe made by a concern that had been out of business for thirty years. 'Must have been a good lathe—they don't last that way now,' was his illogical comment.

"The reverse is true. While many machines built thirty years ago were good for their day, they survive simply because they have never been used as high-production machines. If one of these 'good old lathes' were put in the production line of a modern plant it would be ready for the cupola in a short time.

"All credit to the old builders of machines. They built well considering materials and facilities. But the idea that machines were ever built better, or even as well as at present, is not only erroneous but harmful."

THE BIGGER VIEW OF EDUCATION

More and more we are coming to regard education as a means of acquainting the young with the nature of their lives. the nature of their environment, and the ways and means of mastering both. The fundamental idea in any effective education, therefore is to discover and gain control of the essential principles of life and of conduct.

Nearly always, education has been too narrow or too one-sided to take cognizance of both aspects of life—knowledge and conduct. One generation will place all the emphasis on knowledge in the belief that the knowledge of the principles of life will lead to proper and effective living. Then a generation has to suffer in order to learn that knowledge is at best but half of education. Another generation discounts the acquiring of knowledge except by experience and the trial-and-error method, only to find that life would be spent on this basis before one gained sufficient knowledge to live effectively.

Happy will be that generation whose knowledge, instruction, and education eventuate in effective and satisfying conduct.

The various phases of industrial and vocational education have through the years swung uncertainly and unsteadily back and forth between the extremes of unapplied knowledge on the one hand and more or less impractical and detached skill on the other. Now that fields have become more clearly defined, the psychology of education better understood, the purposes of the various school activities definitely stated, greater progress should mark each year of our work, and the results should be more clearly recognized and appreciated.

The way for industrial-arts and vocational teachers to forge ahead is through a more thorough study of the whole scheme of education, with its underlying history and philosophy. Only in this way, can they evaluate their own specialties in their proper adjustments and relationships to the general field of education. Perhaps the largest advance made by industrial specialists in the last decade has been along the line of seeing their own work as an integral and important part of the larger whole of education.

THE EXCHANGE PROFESSOR IDEA

It has become quite the usual thing for colleges and universities in this country and Europe to exchange professors for series of lectures or for definite periods of time. This plan has in it much that is commendable for the institutions and countries as well as for the individuals involved in the exchange.

Except in very rare instances, the great profit of such arrangements accrues primarily to the individual professors making the exchange. Through them, of course, their own departments or institutions are influenced by their experiences. A few instances have come to our attention where teachers of industrial and vocational work in this country have exchanged work especially during summer quarters or sessions. Teachers in western teachers' colleges or universities have in a few instances exchanged for the summer with teachers in eastern or middle-western institutions. Some from the northern institutions have exchanged with teachers in the far south.

We cannot think of a more profitable arrangement. In this way, one teacher comes to see a problem from a new point of view. Under new and sometimes difficult conditions, he becomes more tolerant in his attitude toward those who have to struggle with adverse sentiment and inadequate support. Many times also he can smooth out some of the difficulties that have impeded the progress of the man with whom he is exchanging. Whether he will really be helpful to such teacher depends, of course, upon his professional attitude, his discretion, and his spirit of fairness toward the man for whom he is substituting temporarily.

It would seem to be better than a summer's loafing vacation, simply to exchange work with someone in an institution in a different part of the country, with different surroundings, dealing with students from somewhat different environments, and meeting the problems of this different field in a somewhat different way from that in which the teacher has been accustomed to meet them. Instead of reading about what the other fellow is trying to do, how enlightening it would be to try to do the other fellow's work for a time! We most heartily commend this arrangement to such as may be so situated that they could make the exchange.

Even where teachers take leaves of absence during the summer to study instead of teach, it might be highly advisable for other teachers also to take leaves of absence from their regular positions to teach for those who are on leave for study.

ARE YOU RUNNING A DUMP?

Laurence Parker, State Teachers' College, Pittsburg, Kans.

Every once in a while the manual-training teacher suspects that his room is being used by the other departments of the school as a dump. He sees some of the keen boys avoiding his work. He hears in a roundabout way perhaps that boys sent to him are too dumb to prepare for college. Did you ever find yourself in this situation? Did you ever wonder if you were running a dump? Here, perhaps, is a crumb of comfort for you which is based on a "Kellygram" written by Fred C. Kelly for the Columbus *Dispatch* of Columbus, Ohio.

"I heard an educator observe recently, that it would be interesting to know why Donald Chester French, the sculptor, never went to college; why Henry Bacon, architect of the Lincoln Memorial, never went to college—nor John Sargent, and Joseph Pennell, artists.

"Not long after that I took to reading autobiographies of a number of famous men and was shocked at the number who either hadn't had much schooling or didn't do well in school.

"Napoleon stood 42nd in his class. What ever became of the 41 ahead of him?

"Patrick Henry used to stay out of school for weeks at a time to go fishing and hunting.

"Sir Isaac Newton made such a poor showing in his studies, that at 15 he was taken out of school and sent to work on a farm.

"Robert Fulton, inventor of the steamboat, was looked upon by his teachers as a hopeless dullard.

"George Eliot, novelist, had difficulty in learning to read.

"John Hunter, celebrated anatomist, had so keen a dislike for school that he could neither read nor write until more than 17 years old.

"James Russell Lowell was suspended from college for incompetence.

"Emerson's teachers thought him a dunce.

"Gladstone gave no evidence of unusual ability when in school. Neither did Oliver Goldsmith, Henry Ward Beecher, Thackeray, Pasteur, nor Daniel Webster.

"Pierre Curie, discoverer of radium, was so dumb in school that his parents were compelled to get him a private tutor.

"Such a list of seeming dullards, who later became famous, might be indefinitely extended. Evidently they succeeded not because of their schooling, but in spite of school."

GRINDING FARM EDGE-TOOLS

Louis M. Roehl, Ithaca, N. Y.

OF all the jobs that farm boys have in the routine work of farming, the one which gives the minimum of satisfaction and the maximum of annoyance is that of turning the grindstone. Retired farmers enjoy great pleasure in knowing for a certainty that they are done with that job in particular.

The question is, Can grinding farm tools be made a pleasure at a low cost, without damaging the tools in the process?

To find the right answer to this question, tests were conducted with an emery grinder which costs less than seven dollars and is available through the mail-order houses. The grinder was driven with a ⅛-horse-power electric motor. The speed of the grinder was about 2600 r.p.m. The motor was equipped with an extension cord and fastened to a light socket as is done with a sewing machine motor or a vacuum cleaner. The cost of the current was figured at twelve cents per K.W.H. rate. The following table shows the time required to grind each tool and the cost for the power at the twelve-cent rate:

GRINDER TEST

Tool Ground	Time (minutes)	Cost of Current	Remarks
Ax	8¼	$0.006	Dull, very thick, and nicks in the edge.
Ensilage cutter knife	21½	.018	A 16-in. knife and the nicks ground down to a 1/16-in. edge.
Five foot mower sickle	17½	.012	A 5-ft. saw gummed out from ¼ in. to 1 in.
Gummed a crosscut saw	22½	.02	
13-in. corn-harvester blade	9¼	.006	Very Dull, irregular, and nicked.
Cultivator shovel	4¼	.0024	
Rolling coulter	9¼	.0048	
31-in. scythe	11¼	.006	Very dull and rusty.

FIG. 3. SICKLE GRINDING ATTACHMENT.

In conducting the tests, the motor and grinder were fastened to a 2-in. plank, 12 in. wide, and 32 in. long. The holes for the bolts, which held the motor, were made slotted so that the belt could be tightened easily and quickly by merely loosening the nuts on the bolts and crowding the motor back tight in the belt. Having the outfit mounted on a plank is preferable to having it fastened to the top of a bench, as it may be shifted in position as desired for a variety of grinding work and also set elsewhere out of the way, when so desired.

The grinder comes equipped with two stones; a beveled stone for sickle grinding, and a 6 by 1¼-in. stone for tool grinding. Both

FIG. 1. TRUING UP AN EMERY GRINDER WITH AN EMERY DRESSER.

It is true that electric power is not available to all farmers, but electric-power lines are being extended to farms in increasing numbers, and the time is rapidly approaching when all farms and farm homes will have electric light and power.

On farms where electric power is not available, the gasoline engine and a countershaft can be used to run the grinder. The engine may be belted directly to the grinder, if it is securely fastened to a concrete base. It cannot be done successfully if both grinder and engine are on the same bench, such as a workbench, as there is too much vibration to allow good work to be done. The countershaft is far better than the direct drive, if a gasoline engine is used for the power. The electric motor has a very decided advantage over the gasoline engine in the convenience which it provides.

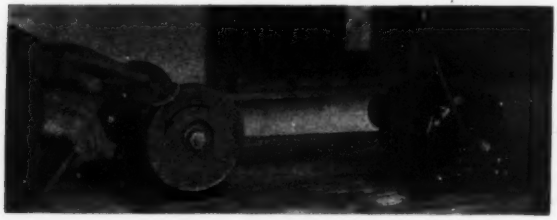


FIG. 2. GRINDING AN AX.

stones were out-of-round when mounted on the shaft, and the first job was to true them up. This was done with the emery dresser, as shown in Figure 1. It is recommended that this tool be purchased at the same time as the grinder. The cost is about 60 cents. It is held on the tool rest firmly against the stone for truing up the stone and removing the glaze.

Grinding an Ax

The first thing to do in fitting an ax is to hold it flat on the tool rest, with the cutting edge against the grinder. It is held against the grinder lightly. The edge is ground down to the depth of the nicks, and the cutting edge is also ground to its proper shape. It is then held on the grinder, as shown in Figure 2, and moved back and forth and right and left on the grinder. By moving it right and left excessive heating of the metal at one point is prevented. By moving it back and forth on the stone, the rounded condition is obtained instead of flat surfaces. The distance to grind the ax back from the cutting edge depends on the use to be made of the ax. If it is to be used for splitting wood, a thick blade just back of the cutting edge is preferable to a thin blade. If it is to be used for chopping work, it should be ground thin back of the cutting edge. By carefully guiding the ax as it is held on the grinder, a smooth surface can be obtained such as appears on a new ax.

Two different grinders were used in the test. A sickle-grinder attachment of one of them is shown in Figure 3. All tool-holding attachments come with the grinders. This attachment is pivoted at the bottom and thus makes it easy to rock the sickle back and forth

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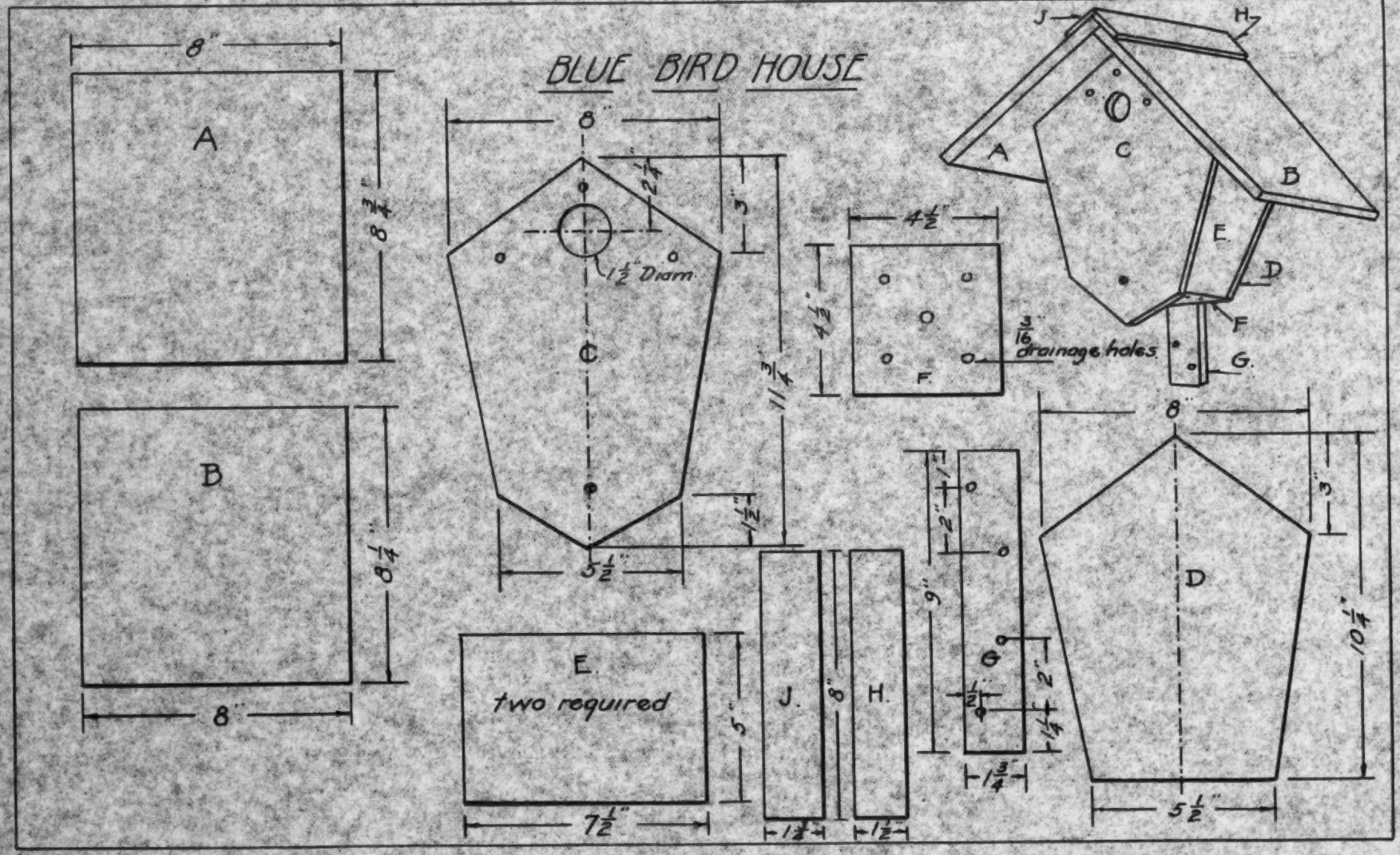
BLUE BIRD HOUSE



Designed by Leon H. Baxter, Hudson, Ohio.

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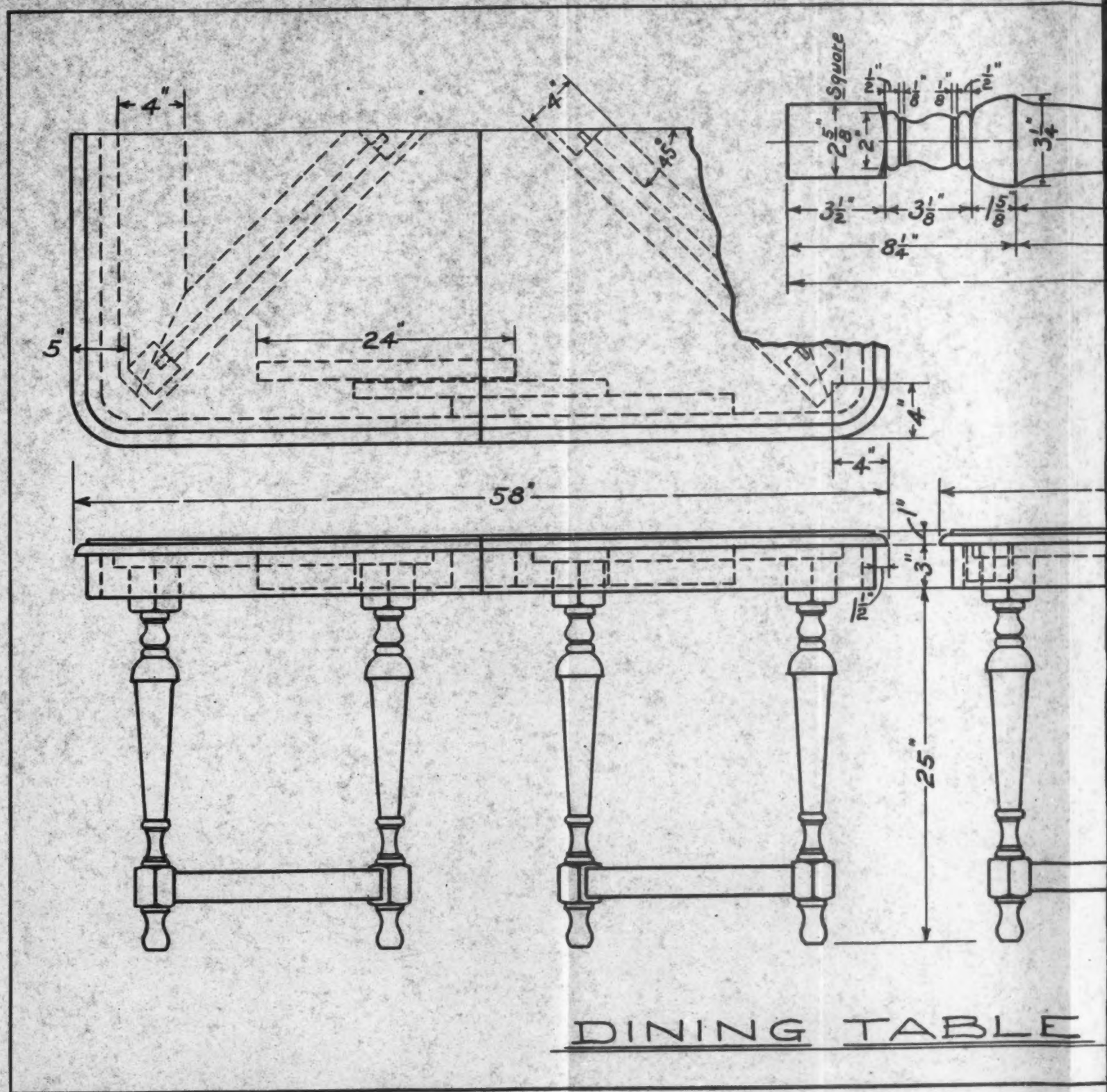

DINING TABLE

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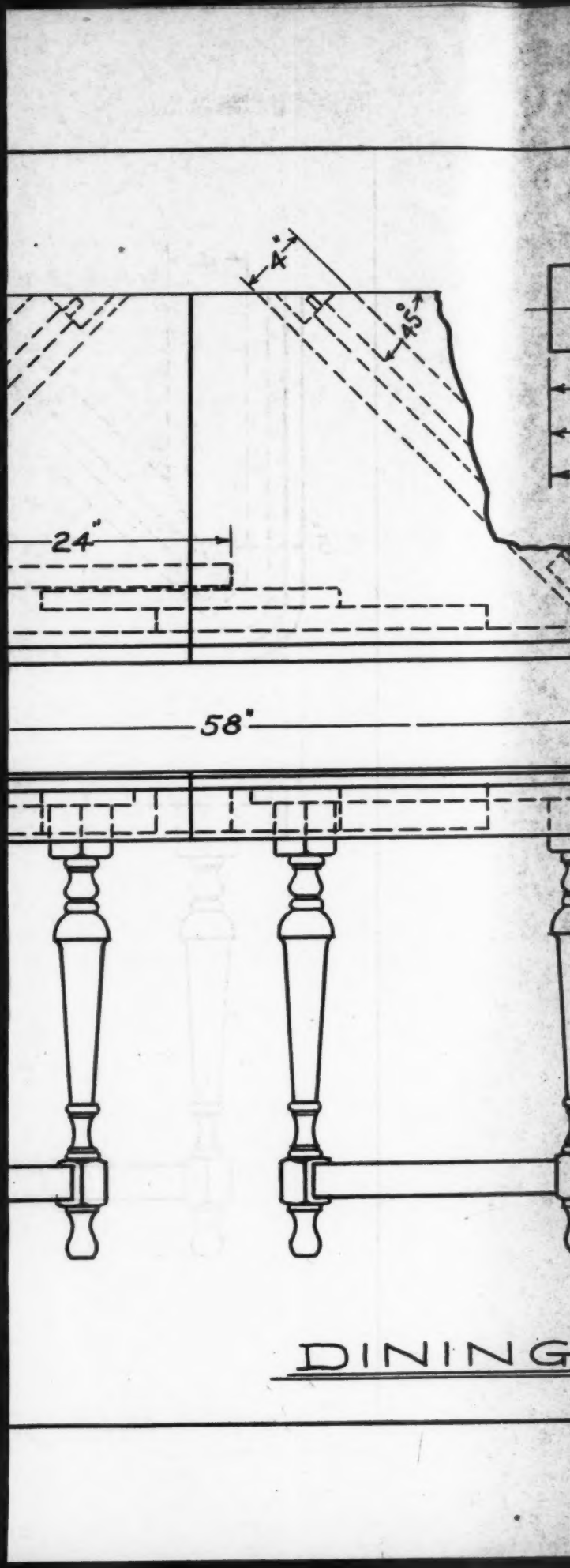
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DINING

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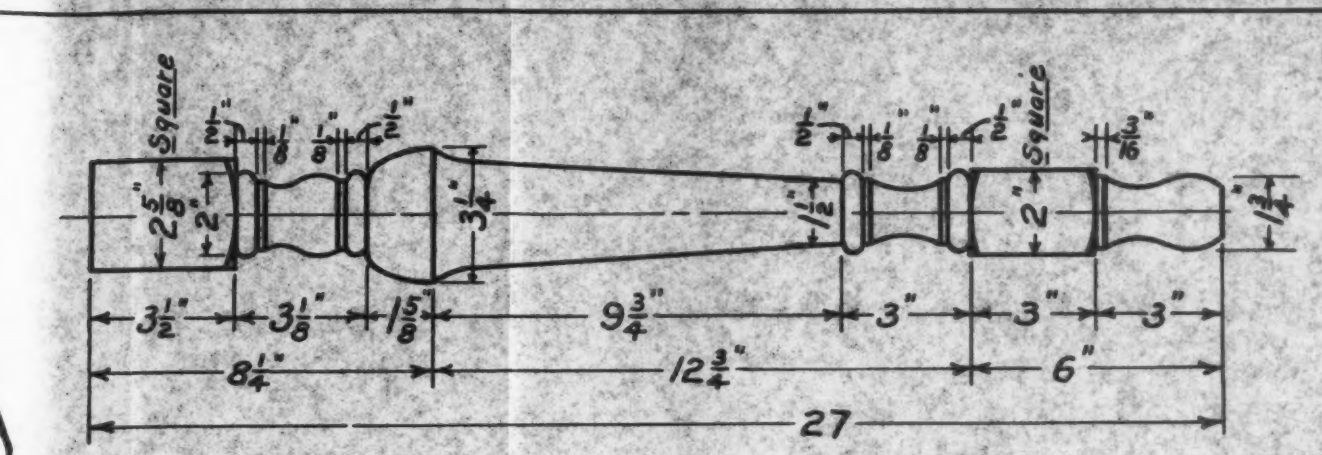

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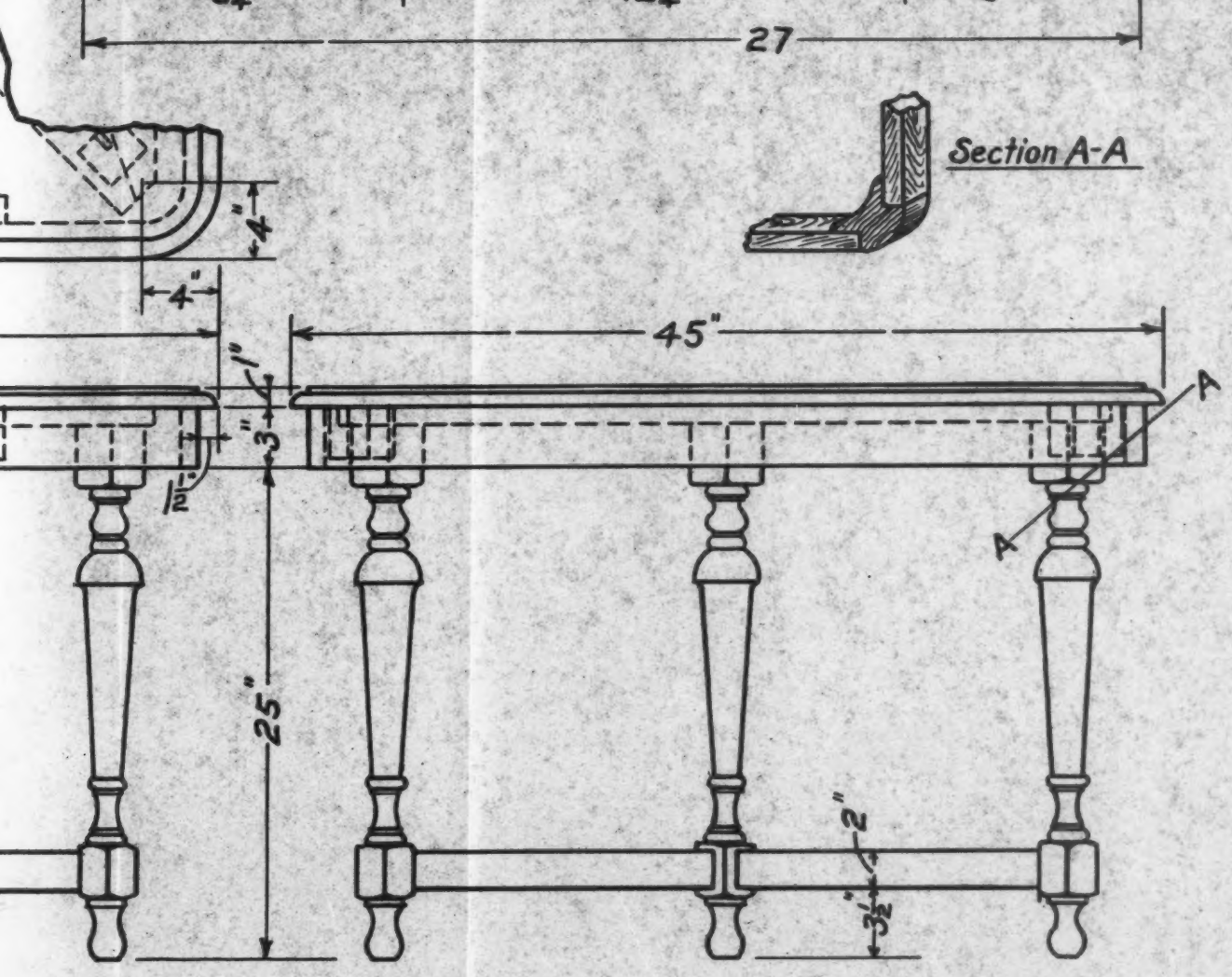

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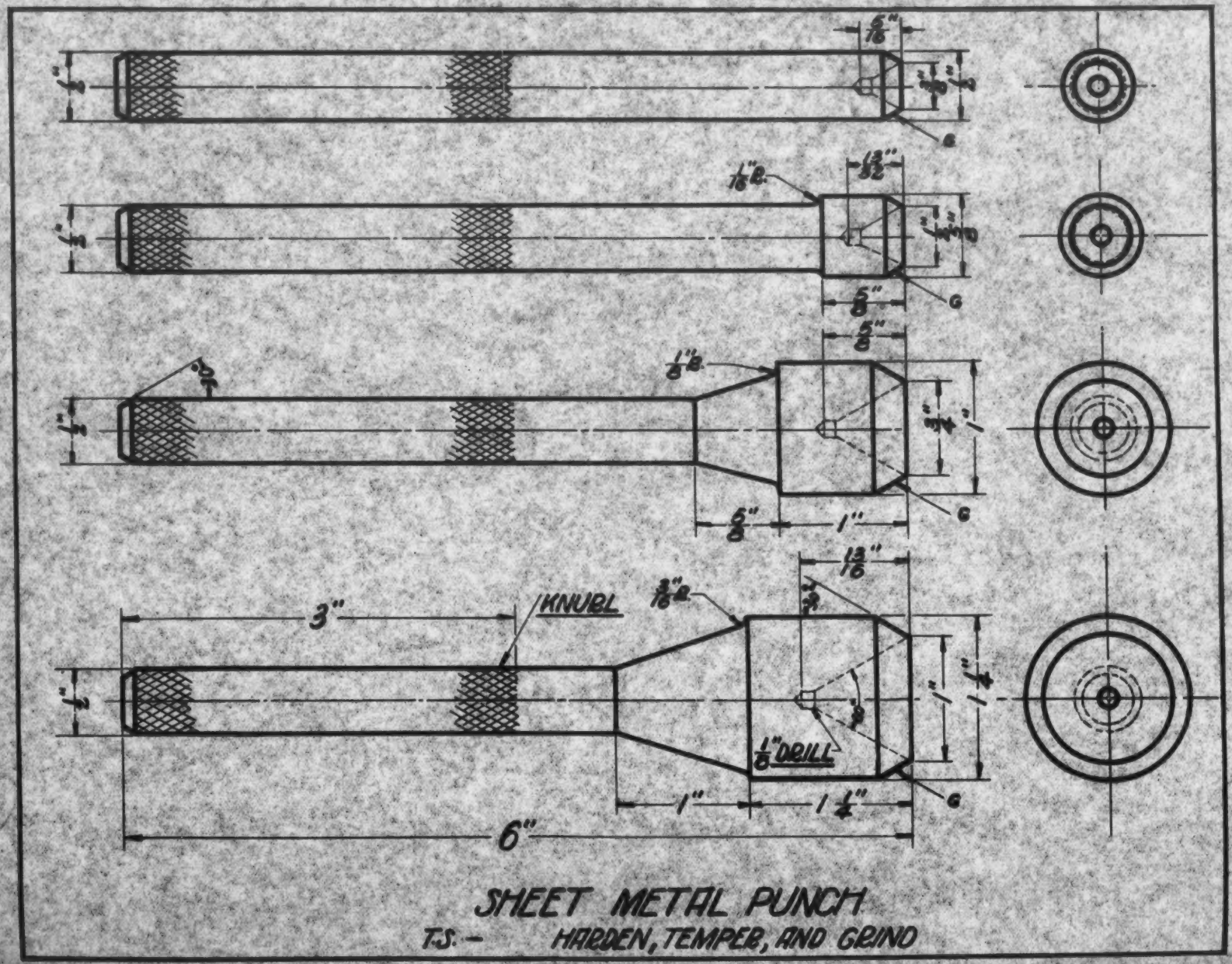

SHEET METAL PUNCH

T.S. — HARDEN, TEMPER, AND GRIND

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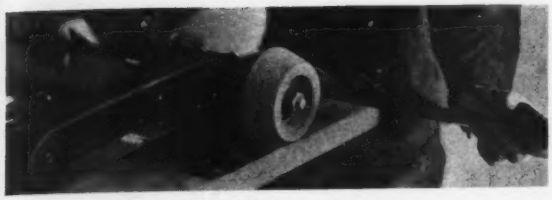


FIG. 4. SICKLE-GRINDING ATTACHMENT.

on the stone. The sickle is clamped in place in the holder and held firmly, thus bearing the weight of the sickle.

Another kind of sickle holder is shown in Figure 4. Loosening the thumb nut allows the sickle to be drawn along in the holder. The way to hold the sickle is shown in Figure 5. By virtue of the beveled grinder, the right edge of one section and the left edge of the one next to it are ground at the same time. The sickle is held on the stone lightly and moved up and down rapidly, and in that way the sections are not burned at the edges. A sickle can be ground very well without the use of the holder, but the holder has the advantage of carrying most of the weight of the sickle.

Grinding a Scythe

When grinding a scythe, the blade is held lengthwise of the stone, as shown in Figure 6. This position has the advantage over holding it across the stone in that it is much easier to get one straight bevel. The blade is tipped and held on the grinder so as to produce a bevel of the required length and then drawn lengthwise over the stone rather rapidly. Drawing it over the blade several times to remove the required stock is better than doing all the necessary grinding at one place at one time, in that it prevents the blade from

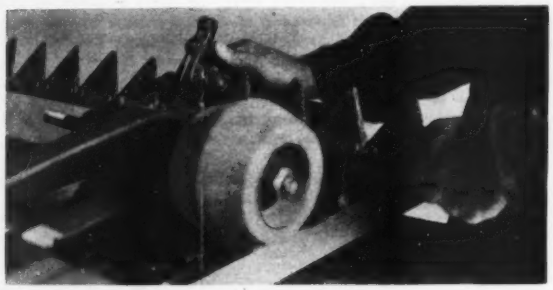


FIG. 5. GRINDING A SICKLE.

heating. The point of difficulty to one who is not accustomed to holding a scythe on a grinder is to hold it at the right angle and, having found it, to place it back to the same position when it has been removed for inspection. It has been found helpful to hold the tool on lightly at what is thought to be the desired position and do a little grinding, then remove the tool and see what has happened, noting carefully the position so as to place it right the second time. When sufficient grinding has been done on one side of the tool, it is reversed and a like amount is done on the other side. The grinding is continued until the edge of the blade has been turned.

Successful work with a scythe depends largely on the way it is whetted. The right position for the workman to stand and hold the scythe is shown in Figure 7. It will be noted that the lower end of the snath is placed on the ground at a point about two feet in front of the body. The left hand holds the upper end of the snath. The whetstone is held firmly in the right hand and the right elbow is held against the body. By holding the arm, scythe, and stone in this position, the right hand does not come up to the sharp edge as the stone is swung back and forth on the right and left sides of the blade.

FIG. 6. GRINDING A SCYTHE.

FIG. 7. SHOWING A GOOD POSITION OF BOYD, SNATH, AND STONE FOR WHETTING A SCYTHE.

When sufficient whetting has been done at the first position to remove the burr caused by grinding and the blade brought to a fine cutting edge, the blade is allowed to drop back under the left arm, as shown in Figure 8, and the whetting continued for the rest of the blade.

Grinding Ensilage-Cutter Blades

There is perhaps no other farm grinding job that calls for so much time and labor as grinding the cutting blades of an ensilage cutter. The blades are long and thick and are likely to be very dull due to coming in contact with dirt and stones in the performance of the work which is assigned to them. The first step in fitting them is to hold the blade on the tool rest straight against the grinder and grind the edge down to the bottom of the nicks. In the grinder used in the test, the nicks were so deep that the cutting edge was about $\frac{1}{8}$ in. thick when the edge was jointed down to their depth. The position to hold the blade on the tool rest for jointing is shown in Figure 9.

When grinding, the blade may be held or supported on the tool rest or in the hands free of the rest. Both ways were used in the test, the advantage being slightly in favor of the former. The position is shown in Figure 10. The blade should be moved back and forth,

FIG. 8. THE SCYTHE BLADE IS ALLOWED TO DROP BACK UNDER THE LEFT ARM AND THE WHETTING DONE AT THE TIP OF THE BLADE.

FIG. 9. GRINDING THE CUTTING EDGE OF AN ENSILAGE-CUTTER BLADE DOWN TO THE DEPTH OF THE NICKS.

right and left, so as not to heat the blade at one point. If it were held in the same plane, the result would be a hollow-ground surface, due to the fact that a grinder of small diameter is used. This would result in a thin edge which would be too weak to stand the work which the tool is to do. If it is ground convex, it will not cut well. The action in that case will be like that of a wood chisel with a convex bevel, or a thick ax. The bevel should be straight. To obtain this, the blade needs to be moved back and forth, up and down, on the grinder as the grinding is done. The grinding is continued until

FIG. 10. GRINDING AN ENSILAGE-CUTTER BLADE.

the edge has been turned as is done with other edge tools. It will be noted that the beveled sickle-grinding wheel is removed for this work, as the left hand is likely to come in contact with the surface in holding the tool. It is good practice to hone a short bevel on the cutting edge, as is done with a wood chisel or plane bit.

Grinding a Cultivator Shovel

The right and best way to sharpen a cultivator shovel is to heat it and forge it out as near the original shape as possible. Since there are but few forges on farms and smiths are becoming so scarce that much time and annoyance accompanies the process of getting smithing done, there are cases where it is the wise move to grind the shovels of the cultivator. In many cases they are left uncared for until they are deemed worthless and then thrown in the scrap pile. The quality of work done with the shovels in a dull or thick shape is not as good as it would be if a little grinding were done. The grinding needs to occur on the back side of the shovel just back of the edge. The position to hold it is suggested in Figure 11. It is suggested that one

FIG. 11. GRINDING A CULTIVATOR SHOVEL.

interested look at a new shovel and bring the one being ground to a shape somewhat like it.

Grinding a Disc Coulter

A position for holding the disc coulter while grinding is shown in Figure 12. It should be moved back and forth on the grinder so as to produce a condition similar to that of an ax. To hold it in one plane would result in a flat bevel and a thin and weak edge. Needless to say that it is also moved right and left as the grinding proceeds and also ground on both sides of the blade.

Grinding a Cold Chisel

A position for holding a cold chisel while grinding is shown in Figure 13. It may be held free-hand or on a tool rest. Holding it on a rest is preferable. The important point in grinding a cold chisel is the angle of the cutting edge. The tool may be sharp but, if the angle is too sharp or too blunt, the tool will not cut well. It should be somewhere between 60 and 70 degrees. Figure 13 also shows a homemade tool rest which is easy to make and works well. It consists of two pieces of 2 by 4 which are nailed together, as shown in the picture. A piece of iron is screwed to the upper edge of one piece and the edge chamfered so as to be out of the way. Two pegs are fastened into the lower side of the bottom piece (pieces of broom handle were used) and the pegs fit into holes of the same diameter in the plank to which the grinder is mounted. It has proved to be especially handy, as it may be removed by merely lifting it out and placed in position by fitting the pegs in the holes.

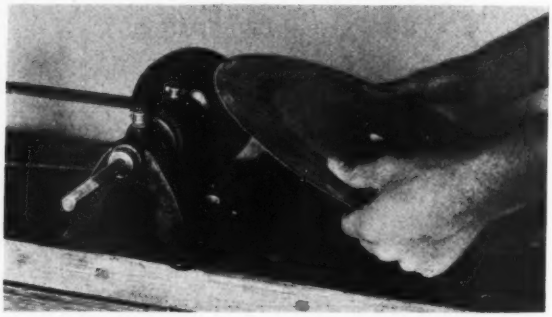


FIG. 12. GRINDING A DISC OR ROLLING COULTER.

Gumming a Crosscut Saw

A grinding job which confronts many farmers is the gumming of the crosscut saw. To do it with the files is an endless task. To send it to the factories seems to be accompanied with enough annoyance to prevent its happening, and so most saws are left to run as they will until they get in pretty bad shape. To gum a saw is an

FIG. 13. GRINDING A COLD CHISEL.

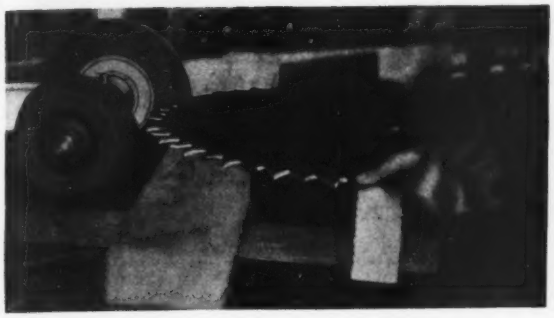


FIG. 14. GUMMING A CORDWOOD SAW.

easy and simple job if one has an emery-wheel stand. A special saw-gumming wheel is necessary as the grinding wheel is too thick. The gumming wheels are made in a variety of thicknesses: ¼-in., ⅜-in., and ½-in. are the most common. A ⅜-in. gummer, 8 in. in diameter, was used in the test and proved to be satisfactory. An additional tool rest was made of pieces of 2 by 4 of a height so that the saw could be fed at or against the grinder at about the center of the stone. To feed it against the stone above the center would result in a beveled bottom at the base of the gullet and the sawdust would have a tendency to crowd out against the side of the saw kerf instead of being thrown out. To feed the saw against the stone below the center would be apt to cause the grinder to climb on the saw and result in a broken stone. In gumming the saw, the stone or grinder is aimed for a point about one third of the distance from the point of the teeth to the center. It is good practice to do a small amount of grinding at one gullet and then move the saw and do some on another so as to give the blade of the saw time to cool. Doing all the gumming at one gullet at one time is likely to result in heating the blade. This will be indicated by the fact that the blade turns blue. The result is that it will become so hard that the files will not cut it. The operation of gumming a crosscut saw is shown in Figure 14.

The time required to gum a crosscut saw with files is so long and the work is so tiresome that but few of the saws in use on farms are gummed in that way. Observation reveals that most of them are not gummed at all. The result is that there is not sufficient space between teeth to house the sawdust that is cut by each tooth, the sawdust is crowded out against the sides of the saw kerf and the saw pulls hard. To gum the saw, the same grinder was used as was employed in gumming the circular saw. To gum a crosscut saw it is necessary that a tool rest be used which will hold the blade for

FIG. 15. GUMMING A CROSSCUT SAW.

most of the length of the saw and at a height at about the center of the grinder. Two pieces of 2 by 4 were nailed together. The lower one was 1 ft. long and had pegs fitted in the bottom to fit the same holes as are used in the other homemade tool rest, and the upper one was 4 ft. long. The saw is placed flat on the rest and the saw crowded lightly against the grinder as shown in Figure 15. It is good practice to do some grinding in a gullet and then move the saw to a different point, thus allowing the blade to cool. If the entire amount of grinding is done in one gullet at one time, the tendency is to heat the blade and so harden the metal that the files will not cut it. This is indicated by the blue color which the blade assumes where the grinding is being done. The amount to grind from a gullet is partly determined by the particular saw at hand. Effort should be made to grind the gullets and file the teeth to their original shape and size. In doing this work but little pressure should be placed on the side of the gummer as it is a rather thin stone and it will not stand as much pressure at the side as the thicker stones which are used for general grinding work. It is not necessary to mark out each tooth. By watching the work carefully the eye is a good enough judge of the size and shape to make the work uniform.

CUTLERY FOR THE SCHOOL FORGE SHOP

Jay F. Knowlton, Supervisor Boys' Industrial Work, Hibbing, Minn.

(Third Article)

The knives made in school shops are mostly for home use in the kitchen and come under the butcher-knife classification. They are accepted by the boy's mother with great pleasure, for, as a rule, the housewife does not see the use of buying a high-grade knife. She does not as a rule realize the difference in the grades, and never having had a good knife, she is content to use cheap ones. How a woman enjoys a sharp knife and one that will stay sharp a long time! If you want to make friends with the housewife, sharpen her knives every few weeks or make her one from real steel. A knife in the kitchen often fails to stay sharp because it has to do all kinds of work from slicing meat, cutting bread, chopping bones, scraping pans, to opening tin cans. It is difficult to convince a housewife that there should be in every kitchen at least four different knives to cover every purpose.

The so-called butcher or kitchen knife includes nearly every shape from the straight-blade sticking knife, to the long sweeping curves of the knife used for skinning. The general design of this class of knives calls for a thin-gauge, hot-rolled steel. When tempered it should not be hard and brittle, but rather pliable. The steel is purchased in strips $\frac{1}{16}$ in. thick and 2 in. wide. This size will cover nearly every shape. Where the design calls for a curved blade, it can be made by bending the steel to fit the curve of the pattern.

The shape of the knife is important. Beautiful curves in a knife are as graceful as the beautiful lines of a yacht. A knife with a stub nose is just as unsightly as a flat-bottomed, square-nosed scow. Special details in shape and lines must be observed if good results are to be secured. There is nothing difficult in designing a good-looking knife, and yet few seem able to do it. One school system sent out courses of study showing the drawing of a small knife that would have been a disgrace in the stone age. Hold to the designs shown in the drawings, and where two surfaces meet forming a line, make the work show that line.

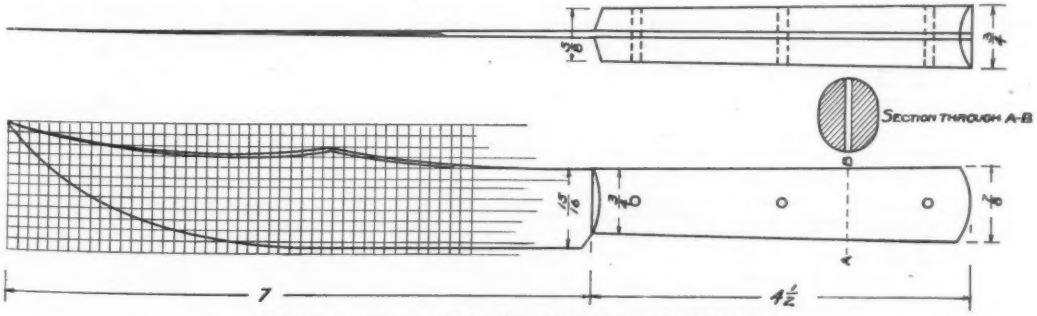


FIGURE 6. DETAILS OF A SLICER FOR GENERAL HOME USE.

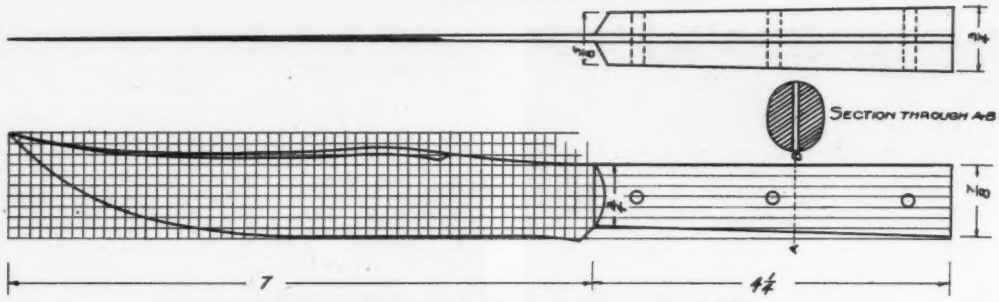


FIGURE 7. DETAILS OF ANOTHER SLICER FOR HOME USE.

A GROUP OF KNIVES FOR HOME USE.

Handles add to the beauty as well as to the usefulness of knives. The design and proportion of the handles is as important as the design of the blades. In a first attempt, hold to the shape and size in the drawings for best results. The tang sometimes passes only half way through the handle. It is better, however, to run the steel the entire length, and in the drawing full tangs are shown. The shape of the handle, which varies in different knives, depends on the use for which they are intended. The heavy butcher knife must have a handle that will not turn in the hand, hence, the square handle with the beveled corners. Bread and carving knives are not difficult to direct, hence the oval handle. The best wood for handles is black walnut as it is hard, firm, cheap when compared with ebony, holds a rivet, and takes a beautiful finish. Maple and birch make good handles, but if expense is no consideration, ebony is best. Rivets may be brass, copper, or steel. They may, or may not have washers. Straight, headless rivets give good results and are more easily worked than rivets requiring washers.

After the pattern has been drawn and the steel cut to length, the class is ready to work the blade into shape. The forging of the blade is a simple operation if care is used. The stock is only $\frac{1}{16}$ in. thick, therefore it will not require a great amount of forging. The cutting edge, however, should be worked a little to insure against the grain of the steel producing strained places and hammer marks that are impossible to remove. Once the steel becomes uneven in thickness and begins to warp or blister, it is almost impossible to keep it in shape for tempering.

The heating for the forging should be done in a large coke fire with no draft and with the cutting edge of the knife held downward. As thin steel bends easily, it is impossible to push it into the fire. Therefore, an arched fire is preferable. *Carbon steel* should never be forged above a *cherry-red heat*. The hammer blows should be light and even; the hammer should have a smooth semibell face if best results are desired. As the drawing of the edge causes the blade to curve slightly away from the edge, it is necessary to give the steel a slight curve in the opposite direction in order to secure a straight blade. In many cases this is not necessary, as the small amount of forging does not change the shape to any great extent. Where a slight change does take place, additional stock should be allowed for cutting off, when the blank is ground to fit the pattern. It is possible to cut the steel for the pattern at once, doing no forging on the edge, but proceeding to the grinding wheel to remove surplus stock. This is often done with thin stock, but light forging of the edge insures steel far more dense in texture. When a heavier gauge steel is used, the necessity of giving the steel such a curve before forging becomes apparent. Forging works the curved blades into the desired shape, the curve the steel takes being governed to a great extent in the forging. There will be some difficulty where the curve does not form to the desired shape, and where there is not enough stock to trim to the desired design, making it necessary to straighten the curve a little. As the blade tapers gradually from the heel to the point, it is a good plan to draw the entire blade from its center lengthwise to the point, thus straightening the curve slightly. Where the curve is straightened in the ordinary manner, the thin cutting edge may buckle, and difficulty will be experienced in straightening.

After the blade has been forged to shape, it should be heated to a low red. It should then be placed in slaked lime until cold, taking care not to bend the blade in placing it in the lime. This anneals the steel and removes all stains.

The pattern is then placed on the metal and marked, after which the steel is placed in the vise and cut to shape with a cold chisel. The blade is ground to shape and trimmed on the emery wheel, after which it is placed on the coarse buffer until the surfaces are true and the edge is straight. It is important at this point to see that the edge grinds down thin, as a thick, round edge does not make a keen, sharp knife. It is placed on the next finer wheel until the knife takes a good polish. The holes are drilled in the handle and the blade is ready for tempering.

(To be continued.)

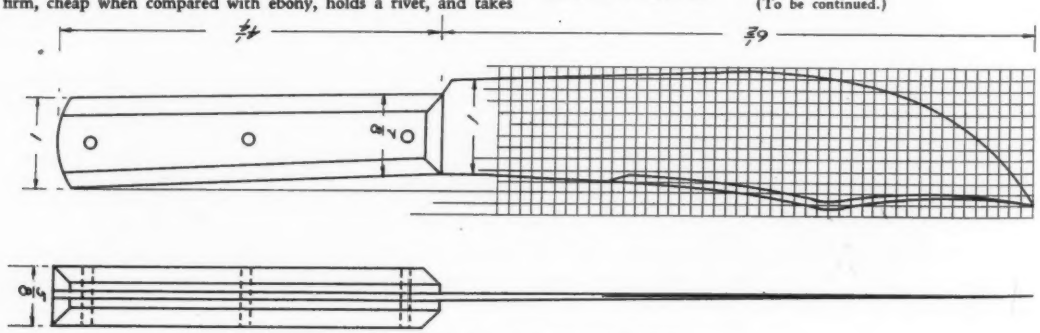


FIGURE 8. DETAILS OF A BUTCHER KNIFE.

SELECTING, FRAMING, AND HANGING PICTURES

Talmage Nichols, Charleston, W. Va.

BY KEEPING A RECORD for a long period of the things brought to the school shop by boys, to be repaired, mended, or changed, I found that pictures were among the articles most often brought. This was not surprising, or to be wondered at, when I stopped to think of the place of importance pictures hold in every home.

Very often the work to be done consisted of nothing more than the placing of a screw eye in the frame while frequently new mounts and frames were desired. Whatever was done, it was evident that it was the outgrowth of a personal interest of the boy or other member

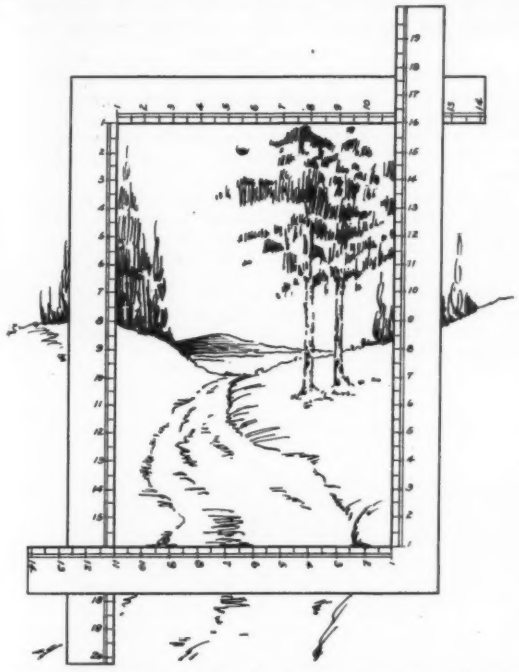


FIG. 1. SHOWING APPLICATION OF FINDERS IN SELECTING A COMPOSITION.

of the family in the picture, and that we had failed in planning our course of study to provide for this kind of work, so that all students might receive guidance and training in selecting, framing, and hanging pictures. To provide this opportunity, it was planned to devote a certain amount of time each semester to simple, definite instruction in picture framing.

Pictures are an important contributing element in the home. They bring more happiness and refreshment into the routine of life

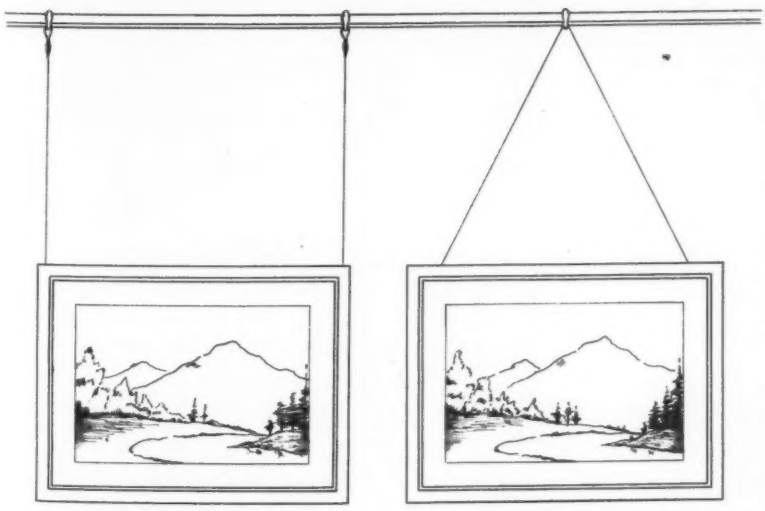


FIG. 2. THE CORRECT WAY TO HANG A PICTURE.

FIG. 3. THE INCORRECT WAY TO HANG A PICTURE.

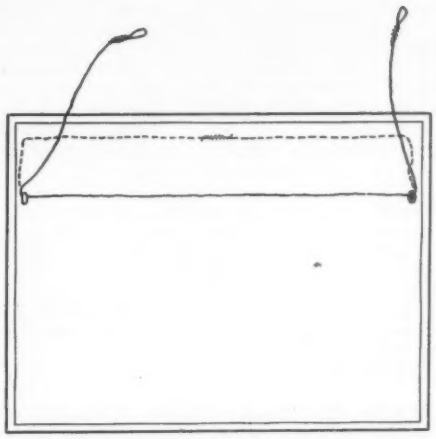


FIG. 4. WIRING A PICTURE.

Showing the correct height of screw eyes, the proper adjustment of wire for hanging pictures from a moulding, and dotted line indicating manner of wiring small pictures to be hung from two small brads driven into the wall just above the screw eyes. Small brads make scarcely a hole in the wall and where wire is not desired may be used.

than almost any other decoration. The culture of the home is indicated in no way more quickly and definitely than in the choice of pictures. In order to realize the most good from pictures, they must be carefully selected, appropriately framed, and correctly hung. Ruskin well says that "a room without pictures is like a house without windows."

The Selection of Pictures

There are two general rules to keep in mind when selecting pictures. First, pictures should be appropriate. This includes a consideration of the subject, size, shape, and place to be hung. Second, they should have artistic or decorative value.

Very often jumbled effects result in the selection and arrangement of pictures in a room, because they are the selections of several members of the family, and usually are of varying subjects and media. It is quite natural for one person to like landscapes in oil; another, subjects in water colors; another, paintings or etchings of animals. There is a wide range of media in which pictures are produced, and individual tastes differ. Such collections, however, may not be arranged in the same room if it is to be considered well-furnished, any more than textures of burlap, chiffon, linen, or cotton bed ticking may be harmonized. As careful attention should be given to this phase of home furnishing as to the things more usually considered important.

I recently visited a one-room school building and observed there on the front wall a large picture of the Coliseum. On the rear wall was tacked a soiled and torn print of Abraham Lincoln. While the picture of the Coliseum was a very fine one and would have been quite proper in many places, it was not so appropriate and deserving of the place of prominence in this particular case as was the portrait of Lincoln.

Pictures of real artistic worth are not hard to find. Usually evervone has a print of some kind put away, which he likes and expects to have framed. Such selections are usually made because of the personal appeal they make to the individual. Reproductions of the best masterpieces may be had at reasonable prices, and photographs and enlarged kodak prints are desirable. Only a little looking about is needed to find pictures suitable for a boy's room, an office, a club, or a den.

A picture that costs very little often does as much for a room in a decorative way as a costly painting. It is by no means possible for us all to own great masterpieces, but it is quite possible for us to own copies, or good prints, of some of them, and these, if used in the proper way, will be quite as satisfactory.

There is a tendency, in this day of the large photograph, to put the family or its friends on display by placing their pictures in every conspicuous place in the home. It is better that such pictures be used in private rooms. If they are especially interesting in themselves, they may be used to advantage in the hall or living room.

Occasionally it is well to ask the advice of an expert before buying certain kinds of

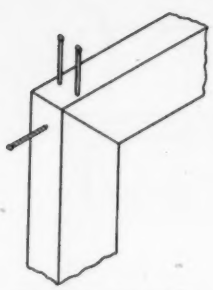


Fig. 5. Showing method of nailing frames at the corners. To prevent splitting the frame holes are drilled for the nails using a nail of the same size for a drill.

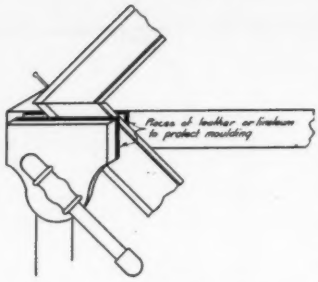


Fig. 6. Showing method of clamping frames in a vise for nailing where a patented mitering and nailing device is not available.

pictures. Usually there is someone among one's acquaintances who is quite capable, and willing, to give helpful suggestions about matters of this kind.

Care should be taken not to overlook the interests and needs of the children when choosing pictures. Who cannot recall vividly some picture of his childhood days, which has made a lasting impression? The Japanese method of changing pictures after they have been thoroughly admired is especially good in the case of children, as their ideas and interests change as they grow older. It is by the contemplation of beautiful things that we grow more like them, and it is but a step from the beautiful to the good.

Framing Pictures

It is not known definitely just when the picture frame originated, and as yet no one has traced its history. Its purpose, however, is to hold the picture in place and to afford a "cloak" or "dress" which slightly demarks it from the surrounding wall, and at the same time harmonizes it with the background. A picture frame that does this without detracting in any way from the picture itself is good. Years ago picture frames were invariably overelaborate and inappropriate. The gingerbread effect has given way in recent years to more simple and artistic types of frames.

It is no longer practical to make up moldings for pictures in the shop, except in very special cases, as moldings may now be had from a number of firms in a variety of sizes and designs. Such moldings are advantageous as they are already finished and are comparatively cheap.

The tools found in any well-equipped shop are all that is necessary to successfully frame most pictures. A patented mitering and nailing device such as is used by commercial picture-frame makers is inexpensive and is very convenient where a considerable amount of framing is to be done. Figure 6 illustrates a very good method of clamping and nailing small frames when a special clamp is not available.

An oil painting is usually framed without a mat or glass, and the frame is selected to balance the weight of the picture. Most pictures can be framed to look well with or without mats. However, the present tendency is to do away with the mats in most cases.

It is desirable at times before framing a picture to trim it to some desired size, or to remove certain uninteresting details along the margins. Finders cut from cardboard and graduated along the margins, as shown in Fig. 1, are convenient in selecting a good arrangement of the elements of a picture and in determining the size before trimming. Several tests should be made with the finders, changing their size and shape in order to obtain the best possible composition.

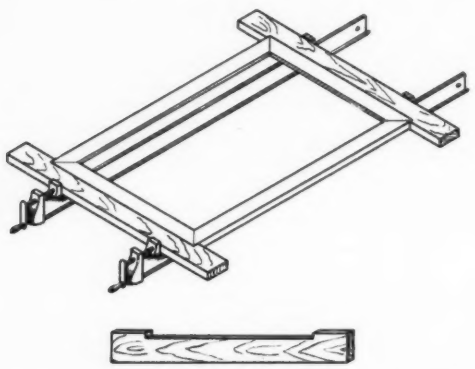


FIG. 7. ILLUSTRATING THE USE OF A JIG IN CLAMPING UP LARGE FRAMES.

In making the final choice of moldings to use for a frame, it is well to test the suitability of the moldings by placing them along the edges of the picture. In this way only can the effect of the different moldings be accurately determined. When pictures have color, the frame should "pick up" the predominant color note in the picture. For a long time the gilt frame was popular, but there has been a change in recent years and now, when it is used, it is very much dulled. Japanese prints or black-and-white pictures are generally good in dead black or gray frames. At all times, both the picture and the wall should be kept in mind when choosing frames.

Hanging Pictures

In order that pictures may have the most pleasing effect when hung, considerable care must be given to the arrangement, placing, and manner of hanging. Though it is not possible for all of us to have the most expensive pictures, it is possible with a little care to have those we own arranged and hung in an attractive and pleasing manner.

One of the mistakes frequently made in hanging pictures is the height at which they are hung. Pictures lose most of their value if not hung at a height where they may be easily seen, hence they should be hung so that the center of the picture is on a level with or very slightly above the eye level of an average person. Under ordinary circumstances this is as high as pictures should be hung, however over mantels or other architectural features this may vary. Contrary to a prevalent belief, the height of the room has nothing to do with the height of hanging a picture.

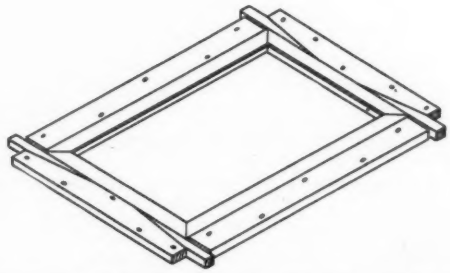


FIG. 8. SHOWING METHOD OF GLUING UP FRAMES BY NAILING FORM TO THE FLOOR OR OTHER FLAT SURFACE AND WEDGING AT THE CORNERS.

When choosing the place for pictures, consideration should be given to good light and proper wall space. Insofar as possible the shape or the arrangement of pictures should correspond with the shape of the wall space or panel; that is, a long narrow picture, for a long narrow space, etc.

When pictures are hung in groups, they should be carefully chosen and arranged for harmony in subject, frame, and media. They should be hung quite close together or grouped so that they will seem to unite or hold together in one large decorative spot. Quite frequently the small picture arrangement is overdone by having walls fairly covered. This grows monotonous and irritating and should be avoided by introducing variety.

In most homes there is picture molding just below the ceiling. Often where the ceiling is unusually high, the molding is lowered to the usual height of a ceiling. Large and medium-size pictures should in most cases be hung from hooks fastened to this molding. Fig. 2. The common method of using a single wire, Fig. 3, is incorrect as the angle formed by the wire is unrelated to the straight lines of the wall and the picture frame.

When wires or cords used in hanging pictures are exposed above a picture, they should be toned to match the wall, making them practically invisible. Such material should be as inconspicuous as possible as it is not intended to be a part of the decoration. Often colored cords are used instead of wires and are finished off at the top with bows, tassels, and the like. As a general rule it is better to use wires in tones to blend with the walls.

Consideration to the matter of proper arrangement of furniture under certain pictures often results in pleasing combinations. Care should be taken, however, not to place large pictures with heavy frames directly above small, delicately-constructed pieces. Where an arrangement of this kind is used, articles of furniture should appear to belong to the pictures hung above them, and the two may be brought closer together by the use of well-selected articles on the furniture.

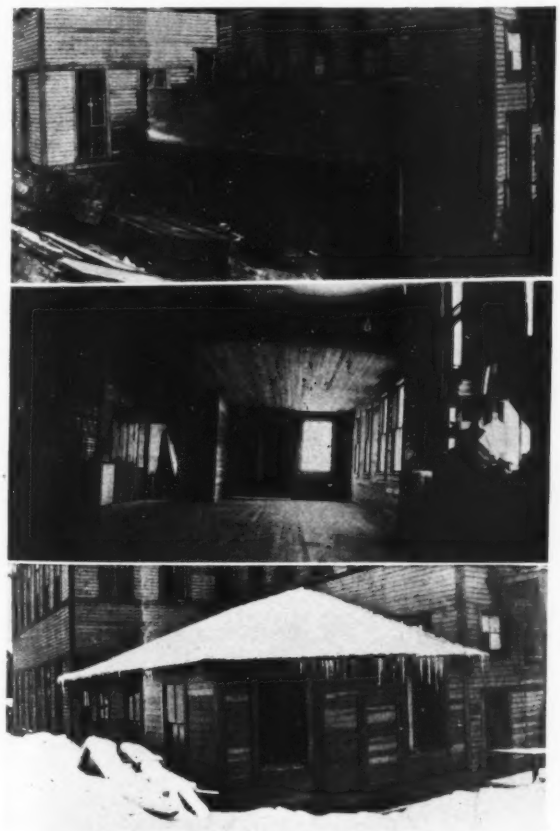
HOW THE MANUAL-TRAINING DEPARTMENT AT ROSLYN, WASHINGTON, MET A SCHOOL EMERGENCY

The schools in the small communities of the far west, cut off from all outside communication, often are in need of funds for buildings, equipment, or supplies which they are unable to supply because of the lack of funds.

The story of how a little town in the state of Washington faced just such a situation and how the students rose to the occasion in supplying the need reads like a western romance. Roslyn is a small mining town on the eastern slope of the Cascade mountains, with a population of 2,500 persons and provided with meager school facilities in the shape of small wooden buildings and very few tools and supplies. Although the community produces more coal than any other in the state very little taxes are paid by the corporation which owns the surrounding property.

The manual-training department at Roslyn was housed in a small room of the high school, and had become wholly inadequate for the purpose. The school system was poor in funds and could not erect an addition to the high-school building. Mr. Purl Stone, supervisor of the department, conceived the idea of having the boys of the department build the addition. He believed that the boys would gain considerable practical experience and that the work would prove a real carpentry project. The department had 25 boys enrolled in manual-training work. Of these, eight had had previous experience with tools and materials, and the remaining pupils were entirely without experience.

Since the school had reached its legal limit of indebtedness and had very little money to contribute toward the work, it became necessary to figure quite closely on the necessary materials to be used in the construction. The supervisor, with the help of the boys, arranged a program of class and shopwork which included the figuring of sizes, the estimating of materials, and the planning of the interior arrangements. The preparation of the drawings, the carpentry, concrete work, painting, and electric wiring were done entirely by the boys of the department working under the direction of the supervisor.



BEFORE AND AFTER.

TOP: An old shed that adorned the rear of the Roslyn, Washington, school building and yard—which was removed.
CENTER: Interior of the new structure just before moving in the machinery and benches. A new floor was laid over the old.
BOTTOM: Completed structure and how it stood the winter weather.

The electrical work was inspected and approved by the local power and light company, following its installation by the boys.

The manual-training department as now organized provides double the space formerly available and it is possible to add to the equipment now in use. Later it is planned to install additional tools and apparatus so that the department will eventually become a very complete and practical manual-arts shop.

ELECTRICAL WORK AT THE ILLINOIS STATE NORMAL UNIVERSITY

A. W. Dragoo

Electrical work at the Illinois State Normal University began five years ago when the youth of the land was first filled with a desire to build a radio set. The most popular project in every shop class was the radio cabinet. Mechanical drawing and design classes were given a wholesome impetus in the application of theoretical principles to practical projects. As a result, better and more beautiful cabinets were made, much better drawings with minute details were executed, and improved class spirit was shown everywhere. All of this was brought about through an attempt to adapt the work to the needs of the class and to the interests of the day.

So much encouraged were those in charge, that plans were immediately made to construct radio sets to fill these fine cabinets. The matter was brought before the school authorities who were quick to see the advantage of this type of work. A room was provided and special equipment was bought for carrying out the plan. Boys in the seventh and eighth grades, as well as boys in the high school, were permitted to work here and construct sets as a part of the regular shopwork. Since the beginning of the work five years ago, a number of radio sets have been constructed during each term.

While the radio has a universal appeal, and every boy wants to build a set, it has its limitations. Not every boy can afford the necessary financial outlay, so this fact alone prevents a radio set from being used as a general class project. In order that more boys might have an opportunity to do some work in the electrical field it was thought best to provide a term's work dealing with more than this one phase of the subject. A year was taken for investigation and study of electrical work in the schools of the country. Courses of study, job sheets, and other data were collected, and a course of study was outlined to fit the needs of students of adolescent age. Projects were designed, sets of blue prints made, and complete sets of instructions on mimeographed sheets were prepared for each project. Not only were sets of instructions for the building of each project provided, but sets of experiments or manipulations to be tried out with the completed projects were furnished. This was based on the theory that each project should serve some useful purpose and that the information gained through these manipulations would be more firmly fixed in the mind of the learner.

It may be of interest here to enumerate some of the purposes and reasons, deduced from various investigations, for the introduction of electrical construction in the junior high school.

1. Universal uses of electrical apparatus:
   a. Homes in which we live.
   b. Factories in which we work.
   c. Vehicles in which we ride.
2. Strong appeal to boys of adolescent age.
3. Thought-provoking properties.
   a. If the project is successful it must have been "thought through." The successful working of any piece of electrical apparatus depends upon the sequence of manipulations, such as the proper connecting up of a set of dry cells.
4. Furnishes ample opportunity for originality.
5. Stimulates constructive skill.
   a. The degree of success or efficiency depends largely upon the accuracy of the construction.
6. The need for knowledge of repairs.
   a. It is believed that every boy or girl should know how to make minor repairs on electrical apparatus such as replacing fuses, repairing plugs or cords, and the reading of meters.
7. To form a basis for future scientific study.
   a. It seems that there would be as many reasons for giving this course as there are reasons for giving mensuration in arithmetic. Mensuration, aside from its thought-provoking properties, surely forms a basis for the study of higher mathematics.
8. To stimulate genius.
9. It furnishes opportunities for experience in a wide variety of materials.
10. Its practical value is more evident than has been true of some of our more formal manual training.
11. Offers greater opportunity for learning than does any other type of work in the manual-training field.
    a. Learning does not necessarily stop with the completion of the project. Projects may be made that can be used for subsequent experiment and for the gain of further information.
12. It is less expensive than woodwork.
13. It is valuable as a tryout course.

Armed with a carefully prepared and definite course of study and the above enumerated reasons for action, the supervisor and critic teachers of the training school were approached with a request that one term of manual training (strictly woodwork) be dropped, and electrical work put in its place. The first question asked was "Where shall we secure teachers for this work?" This, to be sure, had been our hardest problem. However, two young men from the normal department who had had some experience in electrical work had been interviewed and had promised to take over the work. Having solved the problem of teachers, there seemed to be no real reason why the plan should not be tried out. As a result, the two teachers were placed in charge of a class of eighteen boys in the eighth grade. The class was divided into two sections, each teacher being responsible for a certain number of boys.

It would be difficult to imagine a more enthusiastic group of boys than could be found in the electric shop during the last two periods of the day. So successful was this work and so gratifying the results, that plans were at once started for a class in teacher training in the normal school. An additional room was provided and equipped for the work. A term's work carrying major credit is now given as a required subject in the manual-training curriculum. There are, at present, twelve young men enrolled in the class. These young men will go out to teach, carrying with them the enthusiasm and experience of the training school. They will be much better prepared to meet the present demands of youth and to render service in a field so badly needed.

Plans are now being made to introduce this work into the high school. The day of exclusive woodwork is passing—may it quickly come—let us do a greater variety of work and meet the demands of youth half way.

ELECTRIC THRILLER

A. W. Dragoo, Normal, Ill.

The "Electric Thriller," shown in the drawing, is a project used by boys of the eighth-grade electrical-construction class in the training school of the Illinois State Normal University. This is one of the most interesting projects which the boys make, and it never fails to create the most wholesome attitude toward electrical work. The mechanical processes are varied, owing to the use of many kinds of material. Mental activity is found necessary as well as physical skill in successfully completing the project. Much information may be gained through the study of electrical circuits, battery connections, resistance, and rate of vibration which may be had through the speed of the saw-tooth wheel.

The construction of the project is made clear in the drawing. However, it may be well to add the following: C and D are binding posts for the primary and battery. This may be any voltage up to eight volts. A and B are binding posts for the secondary coil. Wires attached to these posts, and held in the hands while the wheel is rotating will give a shock of great intensity. It is a well-known fact that, when a condenser is shunted across the points of an induction coil, the effect is greatly increased. The fast-working boy of the class might be encouraged to build a condenser of tin foil and oiled paper and try out the plan. The teacher will find many uses for this piece of apparatus.

"NOW ASK ME ONE"

John F. Faber, Academy High School, Erie, Pa.

The following questions may interest readers of the INDUSTRIAL-ARTS MAGAZINE who have taken up the current fad of "questions and answers" which the daily press is promoting. Perhaps the present list of questions may be of some informational value to teachers in a professional way:

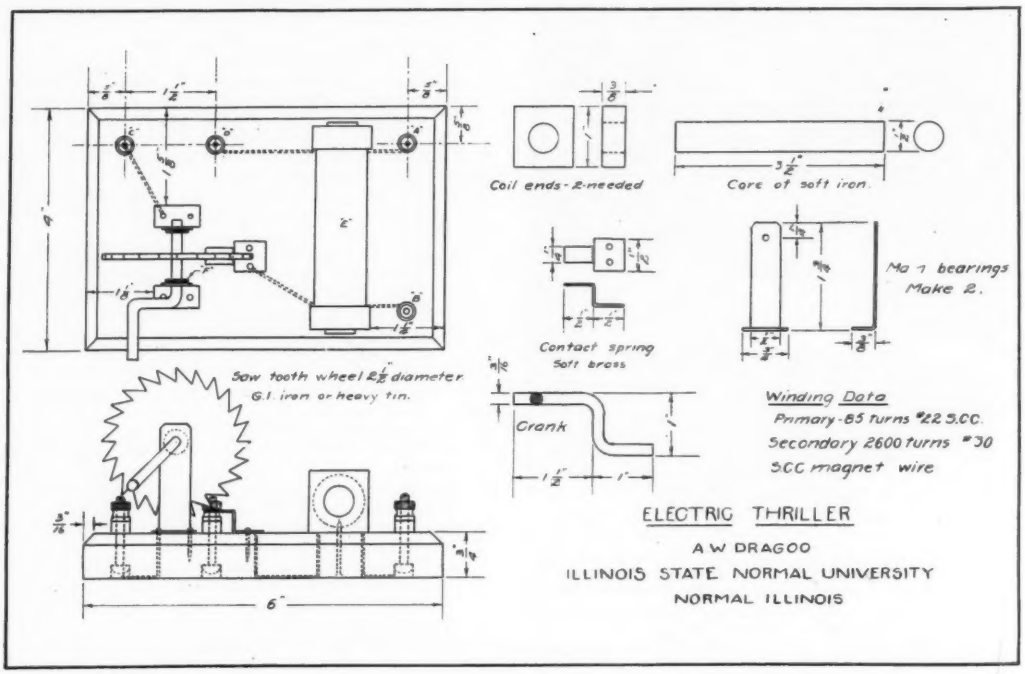
QUESTIONS

1. Where was manual training first introduced in this country?
2. What two organizations were amalgamated to form the American Vocational Association?
3. In what year did the Smith-Hughes Law become effective?
4. What city is given credit for establishing the first "Household Mechanics" course?
5. Where is the 1928 convention of the American Vocational Association to be held?
6. Name two men who are mentioned prominently in launching the vocational-guidance movement.
7. What are the four main steps in a good lesson?
8. Who wrote "The Instructor, The Man, and the Job"?
9. Which state has the strongest apprenticeship laws?
10. Who wrote the book which analyzes a trade according to operations?
11. Who was the last president of the "National Society for Vocational Education"?
12. Who answered the objection to the "Fifty-Fifty" plan of subsidy for vocational education at Cleveland in December, 1925?
13. What is the correct name for special classes for mental defectives?
14. What class organization has been humorously called the "Heintz shop"?
15. What is the name applied to the course where the students attend school half time and work in an industrial plant half time?

(See Page 278)

To Organize Advisory Committee. Plans have been made for the organization of an advisory committee for the vocational department of the public school system at Wilmington, Del. The personnel of the committee comprises most of the men who formed the original vocational committee of the local chamber of commerce, together with two members of the board of education, and five persons representing each of the ten trades taught in the vocational school.

The purpose of the advisory committee is to act in an advisory capacity to the board of education in handling vocational training. There will be a subcommittee representing each of the trades taught, which is to make recommendations from time to time for the guidance of the board.



PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

BLUEBIRD HOUSE

Leon H. Baxter, Hudson, Ohio

(See Supplement No. 62.)

This house may seem a little difficult in construction, but if all directions are carefully followed and each piece cut to its proper dimension, there will be no difficulty experienced.

Make two pieces, F, 5¼ in. square, out of ½-in. pine. After this is exactly the proper size, lay out the octagonal shape by the method shown in Figure X in the drawing. This is done by first drawing diagonal lines from corner to corner. The point where they intersect is the center of the square. Place one leg of a pair of dividers on one corner, with a radius to the center of the square, and swing an arc from side to side. Repeat this, using each corner as a center. By connecting the points where the arcs intersect the sides of the square, we have our octagon.

Next the eight side pieces must be made from ½-in. pine, four pieces G, 2¾ by 9 in., and four pieces H, 3¼ by 9 in. The four sides H must have their long edges beveled so that, when set on pieces F, the edges will be flush with the edges of these top and bottom pieces F.

DINING TABLE

C. C. Sinclair, Auburn, N. Y.

(See Supplement No. 63.)

The dining table shown in the supplement makes an excellent project for high-school boys of average ability. After the student has finished the table he will have a piece of furniture of practical value and one of which he may justly be proud.

The legs should be turned from stock 2⅛ in. square, with blocks ½ in. thick glued on the four sides to give it the proper size for turning at its largest diameter.

The extension slides under the top should be made of maple stock. They should be from 24 to 28 in. long, depending upon the length of the extension desired. The reinforcement strips across the top of the legs should be made of some good grade of suitable hardwood.

DINING TABLE.

The table could be made of any good cabinet wood, but the best effect can be obtained by using walnut or mahogany.

Bill of Material

Rough Stock

6	pc.	2⅛	x 2⅛	x 29	Walnut
12	pc.	½	x 2⅛	x 3	Walnut
12	pc.	½	x 3⅛	x 3	Walnut
4	pc.	1	x 2	x 22	Walnut
2	pc.	⅞	x 3	x 42	Walnut
4	pc.	⅞	x 3	x 24	Walnut
4	pc.	3	x 3½	x 6	Walnut
2	pc.	1	x 29	x 45	Walnut
4	pc.	⅞	x 4	x 27	Maple
2	pc.	⅞	x 4	x 34	Maple
6	pc.	1½	x 2½	x 28	Maple

Nail pieces F to opposite ends of the four sides H, leaving every other space open for pieces G. Take one of the four pieces G and bore a 1½-in. entrance hole, 2 inches from the end of the piece to the center of the hole.

With a ⅞-in. drill, bore four screw holes, so located as to allow the piece to be screwed to the edges of pieces F. This one piece is screwed on, rather than nailed, to allow removing the front board for cleaning out the box. Nail all pieces, except the front piece, in place as shown, using 1¼-in. No. 16 brads. Use 1-in. No. 8 round-head screws for attaching the front piece.

Now all other pieces may be made in alphabetical order, using the same method for marking out the octagonal shapes as was done in marking pieces F.

Make two pieces A, 6⅞ in. square, out of ½-in. wood. Next make two pieces B, 4⅞ in. square by ½ in. thick. One piece C, ½ by 3½ in., is next made. D is 2¼ in. square by 7 in. thick. Piece E is ¾ in. thick by 4½ in. square. Pieces F, two in number, are ½ in. thick and 5¼ in. square.

Supporting piece M is ⅞ in. by 1½ in. by 14 in. with holes bored to screw to edges of piece A and the other holes to nail to a tree. Use 1¼-in. No. 8 flat-head screws for attaching to A.

Bottom piece K is first made 1¾ by 1¾ by 3¼ in. and shaped similar to the one in the drawing. Cut out with a coping saw and chisel and finish with a file and sandpaper.

Assemble all parts, after sandpapering, with 1-in. No. 16 nails.

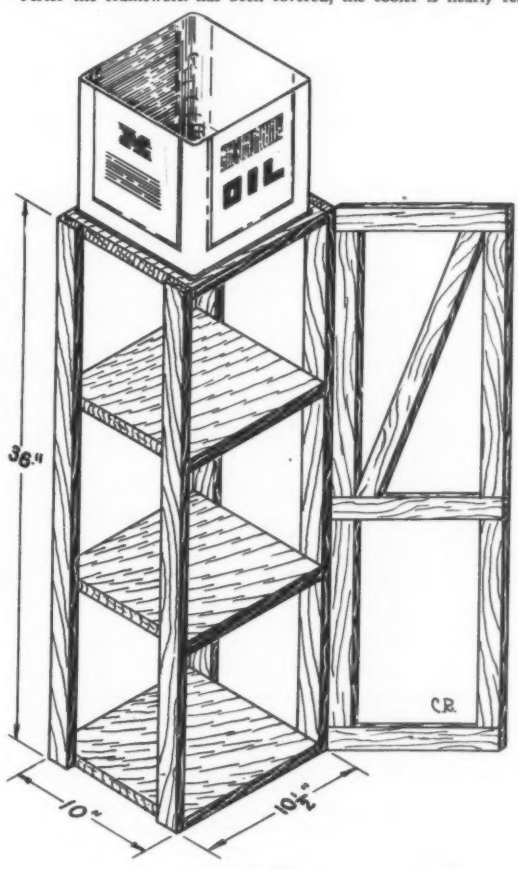
A FOOD COOLING CHEST

C. M. Rice, Everett, Wash.

To solve the problem of keeping food cool without the cost and difficulties of obtaining ice, is readily possible with simple materials and tools. An inexpensive cooler that is practical will be of service to housekeepers as well as campers and auto tourists.

If the builder is conservative, the materials used can be obtained without expenditure of money. Four box ends, not over twelve inches square, are used for shelves. These are held in place by four strips of wood nailed at the corners. The door is a frame of narrow strips hinged to the frame which holds the shelves. The cooler frame and door are now covered with burlap obtained from gunny bags. The burlap is stretched over the frame and tacked.

After the framework has been covered, the cooler is nearly ready



FOOD COOLER.

THE FOOD COOLER IN USE.

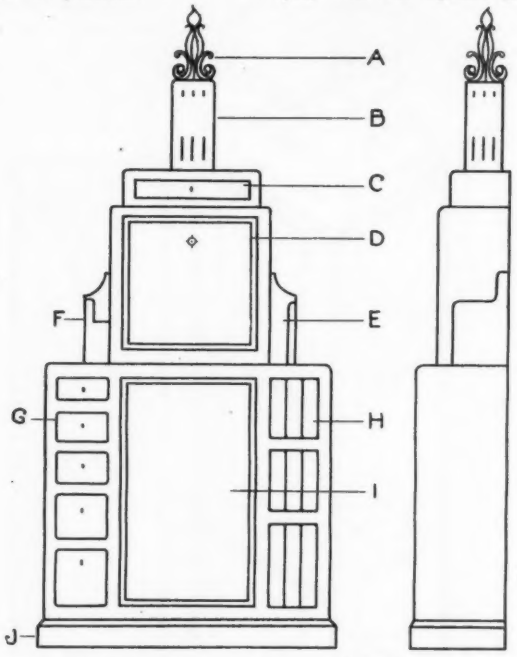
for use. Find a five-gallon kerosene can and remove the top. The sides should be cut about nine inches high. Place the can on top of the cooler and fasten by wiring it to the top shelf. Narrow strips of burlap are draped from the can, allowing the ends to hang for some distance down the sides of the cooler. The can is now filled with water and the burlap sides well soaked in order to start the water dripping.

The evaporation of the water will keep the interior cool. If the cooler is suspended from a wire where it can swing, more water will drip from the can and better cooling action is obtained.

DESIGN

C. A. Kunou, Supervisor Manual Education, Los Angeles, Calif.

The furniture designed in the accompanying cut has been developed to conform to the spirit of the architecture of the present, as expressed in modern apartments and skyscraper dwellings in which space must be used to the utmost. It is free from the inhibitions and the precedents of the "old styles," and still expresses grace



SUGGESTION FOR A NEW TYPE OF FURNITURE.

in outline, law and order in arrangement, and utility in purpose. The structure is in tiers, one above the other, according to convenience and necessity.

Perhaps it may be well to add a word why artificial flowers in a terra-cotta jar are suggested. In modern urban life natural flowers are expensive and difficult to obtain. They do not last long, but wither and decay; they are insanitary in the extreme, because after the first twelve hours decay sets in and the water in which they are kept becomes offensive. Artificial flowers can be made in any home, not only for beautification of the home itself, but also as a part of home industry for commercial purposes. With the exception of fragrance, artificial flowers can be made to excel natural flowers in foliage, color, and form. The most beautiful combinations are easily obtained and they are permanent, sanitary, and beautiful.

Why terra-cotta jars? Terra-cotta or burnt-clay jars are inexpensive and artistic in their simplicity. They may be decorated with compo ornaments and finished either in gold or colored enamel to harmonize with any surroundings. They may be made impervious to water by coating on the inside with pitch.

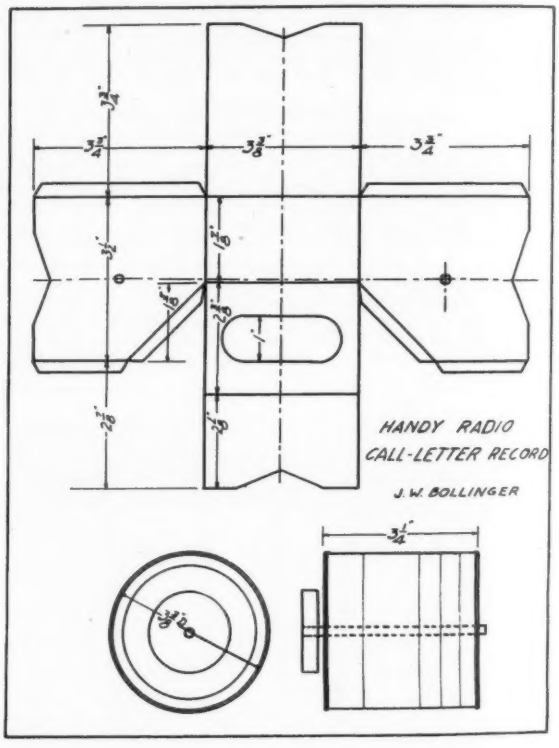
It is perhaps a pity that the modern urban life does not permit more space in the home, and that few modern city dwellers have libraries of substantial standard books. The combination of uses in the present piece of furniture, however, utilizes space, increases efficiency, and concentrates on a few effective needs of the home.

HANDY RADIO CALL-LETTER RECORD

J. W. Bollinger, Tulsa, Oklahoma

Here is a sheet-metal problem which will appeal to the radio fan. All boys like to work with a radio, so that it should be an easy matter to interest them in this project.

Begin by securing a suitable tin can, preferably one with a good lid on it, such as a can in which "Karo" corn syrup is sold. Fasten the lid securely in place by applying solder here and there. Now drill a hole in the exact center of the top and of the bottom, and solder a piece of No. 9 galvanized iron wire in place, one end to project out about one-fourth inch and the other about three-fourths inch. Balance the can perfectly by applying solder to the lid, on the side which is lighter than the other. When finished the can should ride on the wire ends and remain in whatever position it is desired to hold it. Next, cover the can with clean white paper, on which lines have been



ruled, somewhat as indicated in the drawing. The first space is for the station call-letters, the next for the name of the city, and the other spaces for the dial readings.

The hood or cover is made as per drawing. The dimensions may have to be changed somewhat, depending on the size of the can used. The hole in the sloping part of the front, through which the call-letters and dial settings are read, is cut with the help of a hollow punch and a cold chisel. All of the laps should be tinned, before making any of the bends. Begin by soldering about half of the back to the sides; then solder the sloping part of the front to the sides. Now slip the can in place, and finish the soldering.

The knob for turning the can to bring the desired call-letters into view may be an old dial or other knob. The outside of the hood should be given a coat of black enamel, or colored to match the rest of the radio set.

B
A
· CLOTHES · BRUSH ·
6¾"
1"
5/16"
3/16 3/16 3/16
3/16 3/16 3/16 5/16
THREAD WRAPPING
TRIM · TO AN · EVEN LINE WITH A · PAIR · OF · · · SHEARS .
THE · END OF · BRISTLES ARE · DIPPED · INTO · HOT · PITCH BEFORE · PUTTING · INTO · THE HOLES . THIS · CEMENTS · THEM TOGETHER · AS · WELL · AS · KEEPS THEM · IN · THE · HANDLE . · · · ·
OLD · WORN · OUT · BRUSH · ES · MAY · FURNISH · THE BRISTLES · FOR · THESE NEW · BRUSHES
ENLARGED SECTION THRU "A-B"
5¼"
DRILL · HOLES · TO · FIT · OLD BUNDLES · OF BRISTLES
1¼"
½" RADIUS
¼" RADIUS
· SHOE · DAUBER ·
HUGHES.

DETAILS OF BRUSHES AND METHOD OF MAKING THEM.

BRUSHES THAT ARE EASY TO MAKE

F. C. Hughes, Spokane, Wash.

Brushmaking is a subject that deserves a bigger place in school shops, because simple brushmaking is not as difficult in its technical phases as are some other types of industrial activities which we are at present attempting. The work requires no special equipment other than that to be found in the majority of school shops.

In making the two brushes shown and described in this article the work is greatly simplified by the fact that the bristles are obtained from worn-out and discarded brushes, such as floor brushes, scrub brushes, wall brushes, and clothes brushes. In using this type of hair, the assembling or grouping into bundles is done in most cases, in the first construction of the brushes, and the bundles need only to be reset in the new brush handles.

In most of the cases these old discarded brushes, from which may be made these new brushes, are not worn excepting along the edges, and the centers remain almost new. If these brushes were originally set in pitch, they may be washed and renovated before being reset in the new handles.

Quite a variety of small brushes may be made from this same material. There are crumb brushes, clothes brushes, radiator brushes, and shoe brushes.

The first thing to do is to remove the bundles of bristles from the old handles. This may best be done by splitting away the wood, being careful not to cut the bristles. When the bristles have been removed they should be culled and arranged according to color and condition. Those that are too badly worn should be discarded.

The kind, length, and quality of the bristles determine in large measure the kind of brushes that may be made from them. For instance, the long soft bristles obtained from a discarded wall brush or paint brush would be excellent stock for a dust brush for household use, while an old clothes brush or scrub brush might furnish stock better suited to a clothes brush or a shoe dauber.

The two types of brushes shown in this article may be shaped from any of the better woods such as gum, mahogany, walnut, maple, or birch. The small quantity used makes the price a small item insofar as the handle is concerned.

When the handle has been shaped to size, the holes are to be bored to fit the small bundles of bristles, as they were removed from the old handles. The size and positions of these holes vary with almost each individual brush.

After all of the holes have been bored to fit the bundles of bristles, the bundles are dipped in melted pitch and while still hot, placed in the holes and allowed to set. The use of melted pitch must be watched carefully because of the danger of burns which occur if it is spattered or upset onto the hands or face.

If the brushes are not to be used in water, a good grade of waterproof glue will take the place of the hot pitch.

If, as may occur in the case of some of the old brushes, the bristles are in a loose state when torn apart, they can be used by putting into bundles of uniform sizes. One end of these bundles should then be dipped into the hot pitch, about ¼ in. deep and while still hot, given a few wraps of fine thread. To do this grouping and "pitching" of loose bundles, requires some practice. It should not be attempted until one has had some experience with setting a few of the other type of construction.

After the bristles have been set and dried, the ends or face of the brush may be clipped with a pair of ordinary shears.

The finish of the wood handles may be stain, paint, or lacquer. The brushes may or may not have a form of surface decoration.

DECORATIVE ARRANGEMENTS FOR THE FIFTH AND SIXTH GRADES

Richard Ernesti, Colorado Springs, Colo.

Fifth and sixth graders cannot possibly understand the ideas of conventionalization. To transform a nature-object into a pattern for decorative purposes is a project for the high school, sometimes for the junior high school. For the sixth- and fifth-grade boys and girls to learn in the simplest and most concrete way how to fill a space, considering repetition, alternation, rhythm, or radiation, I found it most acceptable to invent units in both straight-line and curved-line expression. Plate A shows the units and how to create or draw them. Care must be taken to be considerate of the size of either circle or other plane to be filled. If the plane is a circle, naturally the unit must be somewhat shorter than its radius, as illustrated in Plate A.

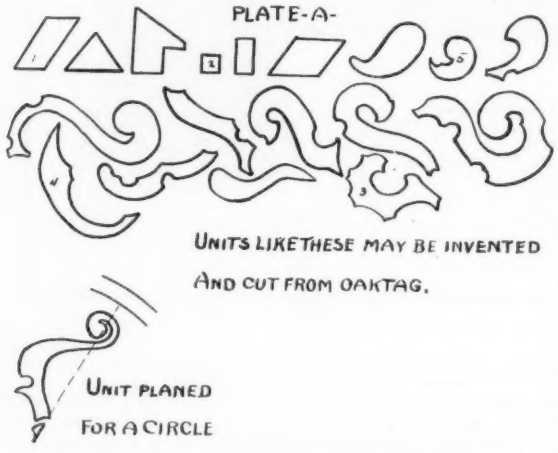
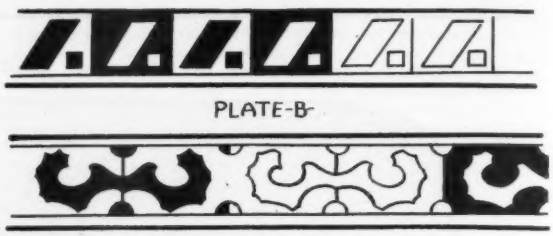


PLATE A. DESIGN UNITS PREPARED BY CHILDREN.



Tracing around the units must be done with care, and care also must be taken in the repeat of any unit.

The decoration can be applied in line expression, as shown in part of each Plates B and C, or it may be filled in by massing the unit or the background. Filling in of these may be done with the lettering pen or brush. In all my experience of dealing with this great subject of decoration, I have not found a method of execution which has brought me quicker and better returns. Units 1, 2, 3, 4, and 5 have been used in Plates B and C. We have done these arrangements in two tones, black, and white, and we have done them in color. This use of a unit, cut as these are from Oaktag which

PLATE C. TYPICAL DESIGN UNITS APPLIED TO A CIRCULAR SURFACE.

is just stiff enough to allow its use for the complete finish of a planed project, has done away with a good deal of worry and waste of time both of teacher and pupil. It certainly has left its impress upon our boys and girls for better returns, even if it has taken much care and effort especially in the invention of these units, which I found the only difficult part of the work. The pupil who has once succeeded in finishing a drawing in orderly fashion and has created a fine repeat in his design, will never again be satisfied with something inferior especially after having worked with these cut-out units that lent themselves so beautifully to this work.

It is worth your while to try this out.

A SHOPWORK RECEIPT

Vick L. Langford, Instructor in Printing, Atlanta, Ga.

Shop instructors, who do any production work or work not taken home by the students, can profit by keeping an accurate record of such work. This is probably true more often in a printshop than in any other, due to the fact that many times instructional work in a printshop is often carried out through production work for the school.

School authorities do not often realize the amount of production work done in a school shop. The writer knew of one printing instructor who was reprimanded by his principal for failing to complete enough production jobs for the school office. The principal's estimate of the number of production jobs completed the first quarter was four, but a check-up on the signed shopwork receipts showed a total of seventeen, all rather large jobs. This was in addition to the work of printing a weekly school paper.

Printing instructors probably keep better records of work done than any other class of shop instructors, because of the fact that their work is largely production work or because as printers, they are in the habit of keeping a time sheet on each job done.

The accompanying shopwork receipt was designed to meet the needs of the several shops in the department of manual arts of the O'Keefe Junior High School, Atlanta, Georgia. Any director or group of instructors could probably change the design to better meet their individual or local needs.

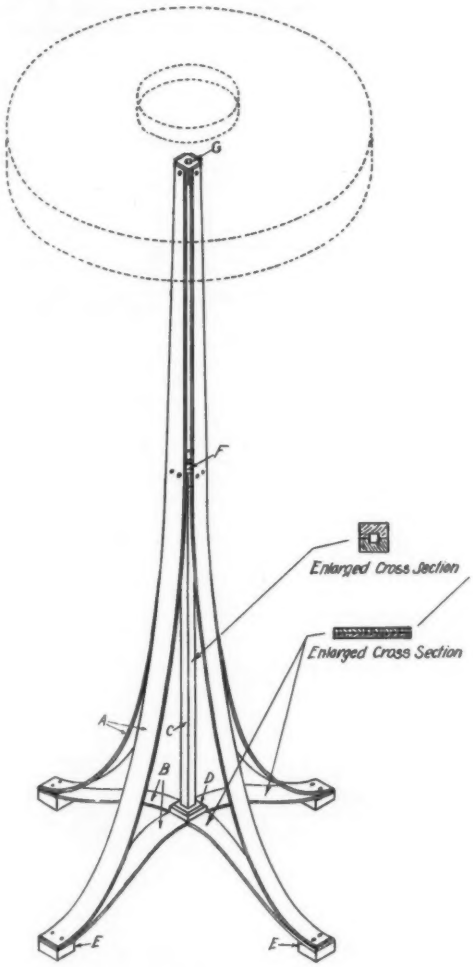
SHOPWORK RECEIPT
O'Keefe Junior High School, Atlanta, Ga.
Department of Manual Arts. C. R. Townsend, Head of Dept.

Shop .....
Nature of work or job .....
.....
.....
Date of request .....
Date desired .....
Date completed .....
Work of students? .....
Work of instructor? .....
Work of students and instructor? .....
Hours ..... Value of time .....
Value of material .....
Total value of work or job .....
Shop instructor's signature .....
Received above work or materials .....
Use reverse side for remarks.

A FLOOR LAMP THAT IS DIFFERENT

E. M. Wyatt, Madison, Wis.

Here is a design for a floor lamp which can be made without a lathe. It is a graceful piece of furniture, which will attract attention by its individual design. It is light, easily moved, entirely firm enough for its purpose and can be made with a minimum amount of material.

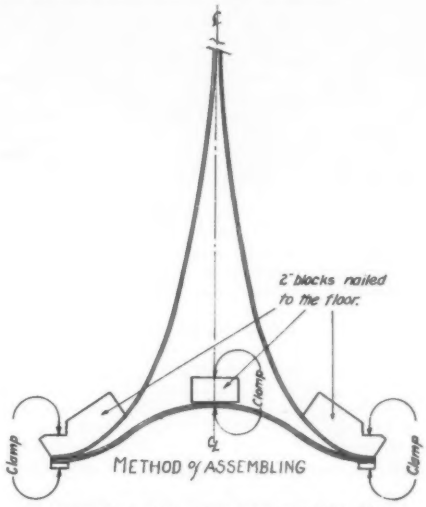


DETAILS OF A LAMP.

It can be made of any wood which will stand bending without requiring to be steamed. It will be well to select pieces free from defects so that the bending will be graceful. Care must be exercised to see that all pieces are of uniform thickness. It will be well if the duplicate pieces are run from the same piece of lumber and planed with the same run of the machine. All this insures graceful curves.

It is well, in getting out all the pieces which are to be bent, to get them a little longer than called for in the stock list so that they can be trimmed off after the assembling. The list of material will give the principal all-over dimensions. The leg piece A, should be tapered to a width of 1½ in. from a point 2½ ft. from what is to be the upper end and the lower end or toe should be tapered to a thickness of ⅛ in., beginning about a foot from the end. This is because this part of the piece requires a sharper bend than the rest and will stand the bending easier because it is thin.

The cross-support pieces are each made up of two pieces ⅛ in. by 2 in., glued together. These are made this way because they must resist the tension of the leg pieces. They also should be run from the same piece of stock and planed at the same time.



SUGGESTION FOR ASSEMBLING LAMP BASE.

The little, square, vertical piece C, is made up of two pieces so that the hole through the middle can be cut with a circular saw or a groover head. This hole through the middle of the plate is made to receive the lamp cord. In gluing these pieces together, see that the glue does not clog up this hole. Plane to exact size after gluing up.

The small parts, D, E, F, and G, have dimensions as in the stock list. The piece D, is just large enough to cover the edges of the cross-lap joint in the pieces B. It is well to mortise a ¾ by ¾ in. hole through, or nearly through, this piece, as this makes a strong way of connecting the piece with the end of C. The sole pieces E, are best glued on oversize and trimmed to size afterwards. They serve the purpose of providing something to level up the stand with, if the spring of the parts under the weight of the whole lamp does not automatically do this. The piece F should have a ¾ by ¾ in. hole mortised into it on the lower side to receive the upper end of the piece C. A ½-in. hole should be bored the rest of the way through for the light cord.

A hole should be bored through the piece G to fit the light fixture which goes above it.

A detail, Figure 2, gives a good idea of the method of gluing the parts together. Two legs and a cross piece are glued up at a time. To start with one should lay off a center line square with a baseline on a wooden floor, to which the bending forms can be nailed. It is well to sketch out with chalk on the floor the curves to which you wish to bend the pieces. Make sure that these are free, graceful curves. The two curved bending-form blocks should be cut out at the same time on a band saw. If the stock is lightly nailed together before sawing, the two pieces can be sawed at the same time, assuring exact duplicate blocks. Be very careful in locating these curved bending blocks on the floor, to see that they are exactly symmetrical with the center line. The small rectangular block on the center line can be located as shown, at this time.

After the blocks are in place, set two of the pieces making up B in place and clamp to test the symmetry and gracefulness of the bend before applying any glue. Note whether any additional clamps will be needed. Only very small clamps can be used at intermediate points on account of interference with leg pieces A which will be put in later. If intermediate clamping promises to be necessary and you have no suitable clamps, you can resort to wrapping with string when you get to gluing.

Loosen the end clamps and insert the leg pieces A to see that they make a graceful bend, also, to make sure that they will stand the bend required of them at the toes. It may be necessary to soak or steam these ends, but this should be avoided if possible as steaming

or soaking will delay the hardening of your glue joint. Usually all that is necessary is tapering the toes down a little thinner.

In gluing pieces B, first put in pieces A after loosening end clamps. The sole pieces E, can be glued on later if you have trouble handling so many parts at a time.

After the glue has hardened the same form can be used for gluing up the other half. When taken from the clamps, it will be necessary to keep the top ends of the legs tied together to prevent them slipping past one another in handling.

Clean off the glue, plane up the edges, square and trim off the ends of the toes at this time, while you can hold the parts in a vise, rather than doing it after the whole piece is assembled.

Now cut the cross-lap joint at the center of pieces B. Fit these together and place the block D in position so as to cover the cross-lap joint. Start some brads for holding D in place. Glue the two edges together at the cross-lap joint, clamping D in place at the same time. It may be necessary to add a thin supporting piece on the underside.

Pieces C, F, and G are held in place with round-head screws. Screws can also be placed at the toes, though if a good job of gluing has been done this will seldom be necessary. In assembling these parts, the whole thing should be placed on a floor and a plumb bob or level should be used. A little straining on one leg or the other can be made a means of making the whole piece set level on all four feet.

Any suitable finish can be now applied. Fixtures can be got from any light-fixture store, suitable for this type of lamp. If you have a soldering outfit, you can make your own shade frame, but if you do not you will find it cheaper to buy your shade frame complete. So far as expense is concerned, you will find it cheaper to buy the shade complete.

Stock List

A—4 pc. ½"x2"x5'-6"+
B—4 pc. ½"x2"x2'-6"+ (each of 2 pc.)
C—1 pc. ½"x¾"x2'-6" (of 2 pc.)
D—1 pc. ½"x2½"x2¼"
E—4 pc. ½"x2"x2"
F—1 pc. 1¾"x3"x3"
G—1 pc. 1¾"x2½"x2½"

FARM MECHANICS—II. SURVEYING AND DRAINAGE

Fred Short, Barron, Wis.

Some knowledge of surveying practice is very desirable on the modern farm. Horizontal surveying, the measuring of distances, the location of corners, measuring angles, and running profiles should come within the scope of this course. This work can be done well with home-made equipment, but a serviceable farm level which can be obtained for about $25 will give better results. Some study should be made of the United States land survey and its units of measure. Practical work should be done in running lines, locating corners, and measuring angles on the farms where the boys live, if possible. Profile work should be done with special reference to drainage. Drainage should be studied with reference to the types of land to be drained, cost, and benefits derived therefrom. Both open-ditch and tile systems should be considered. If at all possible and practicable, a group-drainage project should be worked out by the class on the farm of one of its members.

A typical problem for drainage work is presented.

Combination Range Pole and Leveling Rod

This instrument can be used as a range pole and should be painted alternately red and white in sections one foot long. By inverting the pole and placing the target on it, it can be used very efficiently as a leveling rod. One side of the pole should be graduated in inches for this purpose. This rod can be used in connection with the farm water level, a drawing of which was published in the INDUSTRIAL-ARTS MAGAZINE, May, 1927, page 191. The level should not be placed at too great a distance from the rod as it will be easier to obtain back sights and fore sights.

HOW TO RETARD THE DRYING PROCESS OF SHELLAC

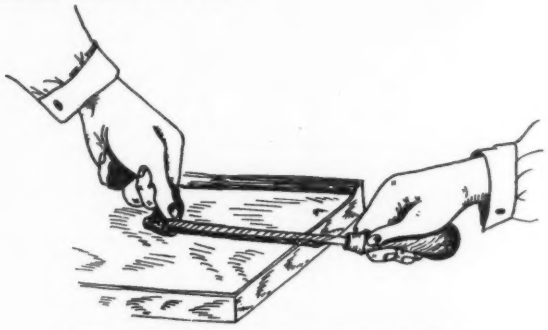
L. F. Hyatt, McKinley High School, Canton, Ohio

Most manual-training teachers encounter more or less difficulty in applying shellac, especially on large surfaces. This is because of the rapidity of the drying process, which in many instances results in unsightly unevenness of the coat of shellac. This is especially true when the work is being done by beginners. The method of overcoming the trouble in some of the industrial plants may prove helpful to the shop teacher. The drying process can be greatly retarded in the following way without the slightest injury to the shellac, whether it is to be polished or rubbed with oil. To three quarts of four-pound shellac add one quart of alcohol into which has been mixed one teaspoonful of glycerin. This mixture will simplify the work with shellac very much as the student has more time to spread the shellac on the surface before it sets.

TRIMMING VENEERING FLUSH WITH SURFACE

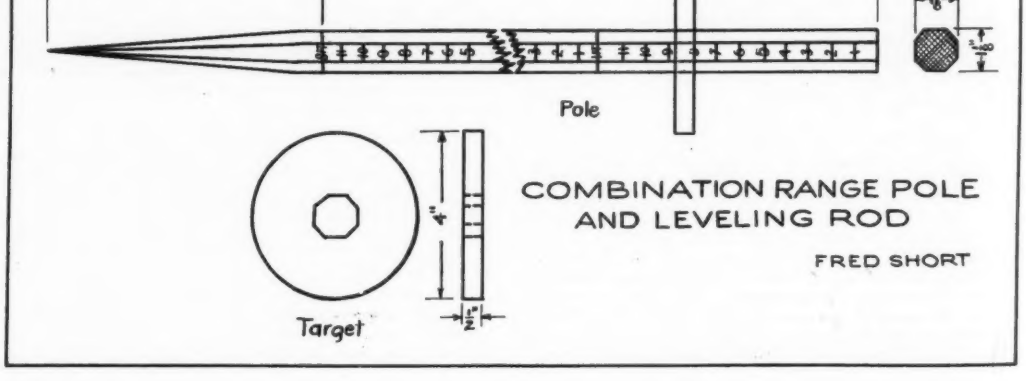
L. F. Hyatt, McKinley High School, Canton, Ohio

In veneering the edges of table tops, pedestal tops, desk ledges, etc., it is somewhat of a problem to remove the veneering that extends above and below the surface. This is especially true when working with tops cut from veneered stock, as a plane or chisel will invariably cut through the surface or split the veneering on the edges so as to mar the beauty of the work.



TRIMMING VENEERING FLUSH WITH SURFACE.

The method which is resorted to in factories is to take a half-round wood rasp and wrap the point of the rasp with a cloth, as shown in the sketch, holding the rasp so that the oval side will do the cutting and allowing it to strike the veneering only when it is pushed back toward the work as any pressure on the back stroke is apt to split off the veneer. The stroke should always be of a shearing nature. This can be done very rapidly with but little practice, by any boy, with practically no danger of splitting the veneer loose from the edge or marring the surface of the ledge or table top. When the veneer is cut flush with the surface a sharp scraper should be used instead of a plane, after which it should be sandpapered.



WESTERN ARTS ASSOCIATION BANQUET, MILWAUKEE, MAY 5, 1927.

THE WESTERN ARTS ASSOCIATION IN MILWAUKEE

The 33rd annual convention of the Western Arts Association in Milwaukee, May 4-7, gave evidence of the splendid virility of the organization and of the ever-widening scope of school shopwork and school-art instruction. Mr. Elmer W. Christy presided over the meetings and handled the program with dignity and dispatch. Mr. Raymond Fell handled the business of the Association with his usual efficiency and dispatch. The local committee provided the necessary accommodations and supplied generous hospitality.

The convention was welcomed by Supt. M. C. Potter, and formally opened by the presidential address of Mr. Christy, in which attention was called to the necessity of readjusting the Association and its activities because of the growth and activities of the various organizations interested in vocational education. The afternoon and evening of the first day were given over to visiting schools and other local points of interest. The principal address of the evening was a paper on the balanced life by Supt. J. H. Beveridge of Omaha, and a discussion of the sales value of fine design in industrial products by Mr. Richard F. Bach of the Metropolitan Museum of Art, New York City.

Throughout the convention it was quite interesting to note how important the element of art and good design has become in the industrial life of the nation. Mr. Bach's paper on the first evening session set the keynote for numerous practical demonstrations of the value of art in industry and commerce, as was evidenced in motion pictures and in addresses of various speakers.

The session on Thursday morning listened to a discussion of the problems of practical arts as a part of the elementary- and junior-high-school curriculum. Mr. William H. Vogel brought to the meeting a report on the remarkable work which he has been doing in promoting art exhibits at the national conventions of the Department of Superintendence. Miss Harriet Goldstein spoke of the value of color, design, and art appreciation in home life. The methods used in designing Lincoln motor cars to express distinct ideas in art history proved to be an interesting digression from the serious business of discussing art-education problems.

The sectional meetings on Thursday afternoon and Friday afternoon were well attended. In fact, the sessions devoted to industrial-arts and vocational education proved to be a distinct surprise in the number of men who were present and in the interest which was evident. Speakers on vocational education were Mr. R. L. Cooley, Mr. Ammon Swope, and Mr. G. P. Hambrecht. The printing section listened to a suggestive address by Mr. Ralph W. Polk and to equally useful addresses by Mr. Ray Keller and Mr. E. E. Sheldon of Chicago. More than usual interest was aroused by a demonstration of Parra Block cutting for printing by Mr. John H. Kerr.

The annual dinner and dance was the occasion for a forceful address on practical arts in modern life by Prof. Arthur B. Mays of the University of Illinois.

The expected radical discussion of art education by Mr. Thomas Munro of the Barnes Foundation proved to contain mild generalizations on art in the schools and was far less radical and condemnatory than was expected. Mr. Rossiter Howard spoke on craftsmanship, and Prof. Walter Sargent of Chicago, closed the meeting with one of his practical, keen, and suggestive discussions of the place of art in American education, in home life, in industry, and in commerce.

Household mechanics and the general shop occupied the attention of the industrial-arts section on Friday afternoon. Mr. Earl Bedell of Detroit, described the plan in use in his city and showed how practical tests are raising the standard of all household-mechanics work. Mr. W. Grosstuck and Mr. J. D. Martin of Lakewood, Ohio, took up in detail the advantages and disadvantages of the various forms of general shop organization. Mr. O. H. Day brought to the meeting a rapid-fire discussion of work as carried on in Kansas City, Missouri.

The session on Saturday morning listened to an address on book illustrations by Mr. Otto F. Ege and was closed with a remarkable inspirational discussion of the deep significance of art education for American life by Mr. F. D. Slutz of Dayton, Ohio.

The next convention will be held in Indianapolis. In the report of the secretary and treasurer it was made evident that the association now has a larger membership than at any time in its history and that its business affairs are in admirable condition.

EASTERN ARTS ASSOCIATION CONVENTION

A. F. Hopper, Plainfield, N. J.

The Eighteenth Annual Convention of the Eastern Arts Association was held in Philadelphia, April 20-23.

Long before the first general session, which took place on Wednesday evening, the Benjamin Franklin Hotel, which was headquarters for the convention, found it necessary to transfer guests to other hotels as over a thousand delegates had arrived from the various eastern states.

The opening session was addressed by Homer Saint-Gaudens, director of fine arts, Carnegie Institute, who took for his topic, "The Value of Art in Education." In the course of his remarks he stated that "we must dare to be natural as a race even at the risk of appearing ridiculous." He asserted, "the first thing we must do is to teach our children not to criticize works of art but to start enjoying them. Works of art are not things to be studied but to be enjoyed."

Saint-Gaudens deplored the overemphasis on business efficiency and said that people should try to get a dollar's worth of beauty in everything they buy and let the material end look out for itself. "Try to show people that there is imagination; that there is soul," he told the teachers, "teach them how they can make efficiency a fine efficiency. Art is an intangible thing. We can't wear it; we can't eat it; we can't make money with it. It is just something to make the heart beat a little more warmly. It won't make life longer, but it will make it richer."

Thursday was taken up with section meetings, the art section being in charge of C. V. Kirby, director of art, Pennsylvania. The chairman of the part-time section was Paul L. Cressman, assistant director of part-time education, Harrisburg, Pa., while the manual-arts and vocational section was taken care of by Charles Bauder, director manual arts and vocational education, Philadelphia. The home-economics section was in charge of Dr. Henrietta Calvin, director of home economics, Philadelphia public schools. There was also a section on correlation, with George Hatch, assistant director manual arts, Boston public schools, as chairman.

An unusually attractive program was arranged by each section chairman, and many well-known people, including the following, addressed these meetings: Raymond P. Ensign, dean, Art Institute, Chicago; William L. Longyear, Pratt Institute, Brooklyn; L. H. Dennis, deputy superintendent of public instruction, Pennsylvania; Lewis A. Wilson, director vocational education, New York State; Wesley A. O'Leary, assistant commissioner of Education, New Jersey; Dr. Harry Kitson, professor of education, Teachers College, Columbia University, New York.

The general session on Thursday evening was addressed by Dr. Rollo Walter Brown, well-known author and lecturer, who took for his topic, "The Creative Spirit and the American Public." He said, "Creators are those who take life apart and put it together again in

more satisfying arrangements. They combine, for example, the idea of the old cathedral tower and the idea of small space in the downtown section of the city and make such an addition to the history of mankind as the Tribune Tower in Chicago. Sometimes two ideas that seem utterly colorless and inconsequential when standing apart become startling and momentous when brought together. That much can be done to make our big cities less drab and depressing was maintained by the speaker who complained that people are too content to make for themselves an environment that slowly eats away their spiritual lives."

Dr. Charles L. Spain, deputy superintendent of schools, Detroit, Michigan, also addressed this session, taking for this topic, "The Advantages and Limitations of Specialization in Elementary Schools."

The remainder of the evening was devoted to a "Marine Dance" given by the "Ship," an organization of the commercial men.

Friday morning was spent in visiting the various industrial plants in and around Philadelphia, public schools, and art museums. One large group visited Henry Disston & Sons plant at Tacony. After a very interesting trip they were brought back to the hotel where they were guests at a luncheon.

Another general session took place on Friday afternoon, the speaker being Dr. Hughes Mearns, New York University, and his topic, "The Creative Impulse in Children and Adults." His address was very enthusiastically received. It was followed by Miss Enright, supervisor of manual arts, Boston, who took for her subject "The Significance of the Creative Experience." Miss Enright illustrated her talk by means of several hundred drawings, that had been made in the Boston public schools. She was also assisted by some young people who made a number of drawings before the audience, thus bringing out the main objectives of her address.

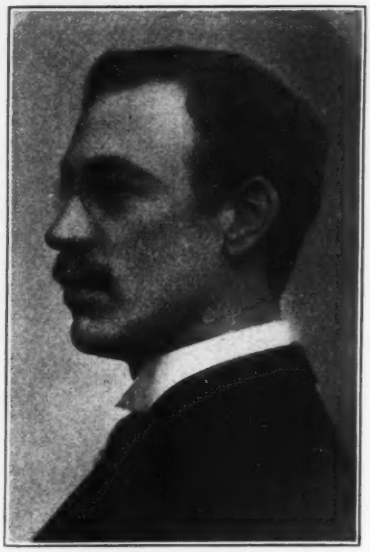
The last speaker of the afternoon was Walter Pach, author and lecturer, who gave an illustrated lecture on "Modern Art." The lantern slides included paintings from many of the French masters.

On Friday evening, 750 of the delegates attending the convention sat down to a banquet. After the dinner, the meeting was opened by some remarks concerning the Eastern Arts Association, by the secretary, Frank Mathewson.

Dr. Lillian Gilbreth, consultant in household engineering, then addressed those present on "Education and the New Industrial Day." In the course of her remarks she stated that through education the entire industrial order was rapidly undergoing many fundamental changes. To make faster progress, however, industry must accept and practice a philosophy that makes work worth while and interesting and must be optimistic as to its outcome. There must be with this an economic theory that gives the producer his proper value, and demonstrates to him that he is fortunate to be a producer." At the conclusion of Dr. Gilbreth's talk, Lorado Taft, well-known sculptor, gave a stirring address on "Beauty in American Life." He attacked the prevalent attitude toward art by many Americans who consider it "a pretty and amusing thing, but after all a superficial matter."

He declared that only through art does life really explain itself and that man has always embodied his highest ideals in art forms to transmit to those coming after him. "If we are to call ourselves civilized," he said, "we too must cultivate this precious thing which expresses the lives of men and transmits that life to other generations."

Mr. Taft declared that America had made remarkable progress in the arts in the last one hundred years, but still lacks many things; the historic background of other countries, the European traditions of beauty, the accumulated inheritance of artistry, and the habit of the handicrafts. "As Americans we have a perfect and inalienable right to our ignorance," he said. "Our title to national indifference is one of long standing. Our ancestors here in this land were without sculptural tradition. There may have been talent, but no favoring sunshine warmed it into life. It was many a year before even portrait painting was indulged in, while two whole centuries passed before a sculptor appeared."



THEO. M. DILLAWAY,
President of the Eastern Arts Association,
Philadelphia, Pa.

Much of American indifference to the arts Mr. Taft attributed to the fact that America seems to be little interested in the creation of an ideal civilization. Also, that, through the belief that any one who works with his hands, must, of necessity, be of an inferior class than others, the habit of using the hands skillfully has been lost. One of our leading educators tells us "that the tacit implication in most schools is: 'Now, Johnny, study hard so that you will not have to work when you grow up.' This attitude is unfortunate in more ways than one. It tends to separate us into classes. When the ambition of half of our people is to avoid work with the hands, when they despise those who have to work, it is indeed a dangerous time for democracy."

At the conclusion of the banquet, prizes given by the commercial exhibitors were awarded by the secretary, Frank Mathewson, to the lucky winners. These prizes, which in many cases were of considerable value, were very much appreciated. After the addresses, the ballroom floor was cleared and the evening was concluded with a very enjoyable dance.

The last general session of the convention was held on Saturday morning. The first address was given by Dr. Z. E. Scott, superintendent of schools, Springfield, Mass., who spoke on "The Place of Arts in the School Program," and stressed the need for competent and comprehensive teaching of art and artistic principles in every public school.

Alon Bement, president of the Art Center, New York, taking for his subject the "Child and the Artist," set forth the statements of Leon Bakst, the late decorative artist, on the great fertility of children in original contributions to the art of design and urged that such child influence be given the utmost consideration.

The concluding address was given by Royal Bailey Farnum, director of art education, Massachusetts, who spoke on "The Need for Creative Art." Mr. Farnum asserted that with eyes ever lifted to the heaven of learning, educators neglected the precious gems of childhood

EASTERN ARTS ASSOCIATION BANQUET, APRIL 22, 1927.

at their feet, "and very soberly and very sedately imposed an artificial training upon these jewels of human life."

"The result has been men and women who cannot play," he said, "adults who must depend upon the grossest kind of entertainment for emotional relief, such as the average vaudeville, the so-called musical comedy and 'night life' with its chatter, cigarettes, cards, and evil sexual thrills, and an unimaginative, irresponsible, law-violating citizenry that knows nothing of the joys of individual achievement in creative expression during either working or leisure hours."

Recently, however, the child world is yielding to exploration and education is tending to recognize more than ever before that it must be reckoned with as a real one, entirely distinct from that in which adults live and move, said Mr. Farnum. To overcome some of the tremendous amount of misdirection that has steered the present generation into an unproductive and barren blind alley of life, Mr. Farnum would teach creative art to the child to counteract the other tendencies.

"We need creative art to develop and nurse ideas. We have been dictating too long. We have always the 'don't' habit with our children. Let us recognize this world of theirs and give them a new opportunity to live in it, and to develop for later use these creative nuggets which the world needs."

All the commercial exhibits were very attractively arranged on the mezzanine floor of the hotel. From the time the convention opened until its close, a steady flow of people visited the booths. These exhibits have now become quite an important factor and are much appreciated by members of the association as they are able to obtain first-hand information concerning textbooks and materials that would be very difficult to secure by means of correspondence.

The school and members' exhibits were very carefully arranged and the work shown was undoubtedly superior to that of other years.

A number of factors contributed to the success of the Philadelphia convention. The local committee under the able direction of the vice-president, Dr. Dillaway, did an excellent piece of work; moreover the program was an unusually strong one. Perhaps the best evidence of this was the fact that probably over 95 per cent of those who attended the various general sessions remained during the entire session, in spite of the distracting noises that are associated with a large hotel in a great city.

Much of the credit for the success of the convention must be given to Frank Mathewson, secretary and treasurer of the association, whose untiring efforts have done so much to build up the association. Another factor that should be mentioned is the fine support that is always given by past officers of the association. A number of ex-presidents were present, many of whom took an active part in the program.

Everyone went home feeling that their time had been well and profitably spent, and all are now looking forward to renewing acquaintances at the next convention which will take place in Hartford during the spring of 1928.

Officers for the coming year were elected as follows:

President—Theodore Dillaway, director of art, Philadelphia, Pa.

Vice-President—Erik A. Andersen, assistant superintendent of schools, Providence, R. I.

Secretary and Treasurer—Frank Mathewson, director industrial arts, Wm. Dickinson High School, Jersey City, N. J.

Council Members—Miss Maud Simpson, director of art, Meriden, Conn.; Burton A. Adams, director of manual arts, Springfield, Mass.; W. C. Wright, Henry Disston & Sons, Inc., Philadelphia, Pa.

PORTRAIT OF MR. PERRY PRESENTED TO PRATT INSTITUTE

A large portrait painting of Mr. Walter Scott Perry, director of the School of Fine and Applied Arts of Pratt Institute, was presented to the institute by the trustees on April 18, in connection with the celebration of Mr. Perry's fortieth anniversary with the school. The portrait was painted by Mr. Paul Moschowitz and will hang in the new memorial hall of the institute.

Forty years ago, Mr. Charles Pratt, the founder of Pratt Institute, asked Mr. Perry, then supervisor of drawing in the schools of Worcester, Massachusetts, to become the head of the art school of the institute. During this long period of service, Mr. Perry has given the best that he had to the department in which he has worked so long and faithfully. It was most impressive as Mr. Pratt and Mr. Perry expressed appreciation of each other after forty years of friendship and cooperation. Members of the faculty and other guests were present and letters of congratulation were received from those who could not attend.

In presenting the portrait, Mr. Frederic B. Pratt paid the following tribute to Mr. Perry:

"It was forty years ago that I, an undergraduate at Amherst, was asked by my father to go with him to Worcester to meet a man whom he was considering to direct the artwork in the newly created institute. The founder had many advisers and many ideas of what the institute should do and be, but he had his own ideas of what he wanted and the kind of man he needed.

WALTER SCOTT PERRY,
Director of the School of Fine and Applied Arts, Pratt Institute, Brooklyn, N. Y.

"Mr. Perry brought to the institute not theories, but definite ideas of what could and should be done and a practical way of carrying them out. He translated thought into action, ideas into realities. I think no one in the early days of the institute gave the founder such a feeling of confidence in his own purpose as Mr. Perry gave.

"As I look back over 40 years I see the impress of Mr. Perry's character and life in every department of the institute. I see ourselves, the trustees, turning to him for advice and counsel both in prosperity and in times of perplexity and doubt.

"It is fitting that we should recognize in this public way the anniversary of the completion of his 40 years of devotion to the best interests of Pratt Institute."

As a reminder of the occasion, the trustees prepared a portrait which was unveiled and given to the institute in his honor.

Mr. Perry was graduated from the Massachusetts Normal Art School, from Pratt Institute, and St. Lawrence University, and studied in Europe, India, China, and Japan. He was director of drawing in the schools of Worcester before going to Brooklyn as head of the art school of the institute.

Mr. Perry is active in the promotion of all the art interests and is a contributor to various art publications. He frequently lectures on such subjects as architecture, sculpture, and painting. He has been an active leader in the Eastern and Western Arts Association.

The personal affection and esteem of several thousand art teachers and as many more artists and craftsmen is perhaps the best tribute to Mr. Perry's service.

A. V. A. NEWS

The American Vocational Association Los Angeles convention committee is holding a series of dinners and preconvention meetings for the purpose of arousing interest and cooperation in making the next national meeting at Los Angeles the biggest and best yet held. They are making a definite drive at the Regional Vocational Conference of the Pacific states, called by the Federal Board for Vocational Education at Salt Lake City, Utah, June 7-10, in order to secure the cooperation of the various state directors and supervisors. It is believed that the cooperation of this group will prove of tremendous assistance in guaranteeing a successful convention.

Already, the possible number of attendance has outgrown the Biltmore Hotel, and the committee has secured meeting places in

various parts of the city, to insure accommodations for the crowds expected.

Mr. J. C. Beswick, chairman of the regional relations committee, has prepared a series of plans to insure adequate support from the surrounding states and cities.

California is noted for her enthusiasm. She certainly is hard at work upon the coming convention, and it will not be the fault of the people of California if this meeting is not well attended by everyone interested in vocational education throughout the United States.

SOUTHERN STATES VOCATIONAL CONFERENCE

State supervisors and others interested in the work of the Federal Board for Vocational Education met for a three-day conference at San Antonio, Texas, during the first week in April. The session opened with an address by Verd Peterson, state director of vocational education for South Carolina, who discussed the functions of the several vocational-instruction units. Following this address there was a discussion of the problem of the state supervisor led by G. T. Sargent, assistant state supervisor of Alabama. Other discussions were: Class Instruction, by J. K. Coggin, state supervisor of agriculture, North Carolina, and led by D. L. Williams, agricultural supervisor of Mississippi; Cooperation with Farmers, by C. O. Moser, president American Cotton Growers' Exchange; and a paper on "Advisability of Developing a Long-time Program of Instruction on an Occupational Basis Instead of by Animal Husbandry, Farm Crops, etc.," presented by J. B. Rutland, Texas supervisor, N. E. Fitzgerald, teacher-trainer for Tennessee, W. G. Crandall, teacher-trainer for South Carolina, and D. M. Clements, Tennessee supervisor.

At a joint session of the home-economics and agricultural groups, Gov. Dan Moody made the address. The joint program was addressed by Miss Anne E. Richardson, field worker for the American Home Economics Association, and President T. O. Watson of the Texas A. and M. College.

The second day of the conference was devoted to section meetings of the home-economics and agricultural groups followed by an afternoon joint session addressed by State Supt. S. M. Marrs of Texas. Other speakers were Miss Ivol Spafford, federal board, and Miss Edith Thomas, southern regional supervisor. Before the home-economics group, Dr. Max Handman, University of Texas, spoke on "Social and Economic Influences on Family Life." Miss Mary Gearing, University of Texas, led the discussion of the section devoted to the family and its relation to home-economics work. At the evening session, the groups heard Dr. Bradford Knapp, president of the Oklahoma A. and M. College, and chairman of the state board, who called attention to the present agricultural revolution as well as to the three national factors of: natural resources, native ability, and acquired ability of the people, stressing the importance of agriculture as a factor in changing natural resources and the possibilities of changing acquired abilities through vocational training. A second address by Miss Anne Richardson presented a point of view from the American Home Economics Association on "Parental Education, a Responsibility of the State." She showed that most physical, emotional, and mental difficulties may be traced back to childhood, therefore, it is both a responsibility and a saving to the state if errors can be avoided by training parents.

At the last session Dr. C. H. Lane spoke on "How're You Going to Keep 'Em Down on the Farm?" Dr. Lane declared that farming could be made attractive and profitable to the type of farmer-business man-scientist who would want to stay on the farm and that no one wanted boys to stay unless they wanted to. On adjournment a number of agricultural men departed for a trip to the irrigated section of the lower Rio Grande valley.

Resolutions called attention to the lack of sufficient agents in home-economics service for cooperation with the several states and the need for developing more adequate state programs. Further suggestions were made for the advancement of community interests in vocational education by means of group organization.

Memphis, Tenn., was selected as the meeting place of the conference for 1928.

THE INDUSTRIAL-ARTS ROUND TABLE OF CHICAGO

Chief Engineer N. F. Fultz had the "cooperative vocational-education machine" at the J. Sterling Morton Township High School tuned up and running to perfection in spite of the date, Friday, Mav 13. Two full periods of work were demonstrated by the teachers and pupils, and as it was parents' night as well, every boy was doing his best. The co-ops were the proud bearers of arm bands, and every member of the Round Table wore a rose so we recognized each other without further introduction. It was the easiest way to get information and a true estimate of the spirit of the experiment that we have found. Some ninety boys are co-ops.

They are recruited from the industrial-arts courses which may include boys of a junior-high-school level and having obtained the endorsement of shop and related subjects instructors, they make written application at the conclusion of the two-year vocational course for the co-op placement. Boys with records of excellent in auto mechanics, machine and tool drafting, building trades, electricity, patternmaking, printing, tool and diemaking, and woodshop may be enrolled and placed with one of a dozen cooperating firms, among which are:

The Illinois Bell Telephone Company, (1) Maintenance, (2) Installation, and (3) Motor Divisions.
The Tractor Works Section of the International Harvester Company.
The Illinois Tool Works.
The Graybar Electric Company.
The Hawthorne Works of the Western Electric Company.
The Northwestern Electric Company.
The Public Service Company of Northern Illinois.
H. W. Caldwell and Sons.
R. R. Donnelly and Sons Company—The Lakeside Press.

The boys are paired in teams of two and do the advanced schoolwork for a diploma, while in training on a regular apprenticeship. The shifts from industry to school are made at two weeks' periods.

All of the instructors of these boys are qualified according to both state and federal regulations. They are expert tradesmen and many are doing extension engineering work. If a demand arises, after the boy has been on the full time job one year, the school will arrange for engineering courses. Since the boys put in 1200 clock hours at standard schoolwork after completing the two-year vocational course, there is no trouble in entering a technical college should any boy desire to do so.

From the appearances of the shop it was difficult to realize we were in school. In the general metal shop, for instance, there were cast-iron projects of smoking stands and, combined with wrought iron, gold-fish bowls and ferneries. Boys rushed from the forge with white-hot bars, which became artistically fashioned toasting forks. In another corner a washing trough took shape for the blue-printing machine in operation across the hall. Heating furnaces glowed with tools to be tempered, while alert future craftsmen watched the color charts on the wall above. Hung here and there about the room were the designs of the metal manufacturers so that not only was the utility of the metal in mind, but its artistic possibilities as well. Some day there will be a canopy over the fireplace in the lobby, dust pans, pokers, and everything.

Morton has all of the shops usually found in our technical high schools and it has more. It has an industrial community where a boy may develop and use the general training received in the various shops through which he passes, or in which he may specialize. Mr. F. M. Pepper of the Bell organization, was an interested observer in the telephone section of the electrical shop. Here boys were using many mechanical devices and performing many of the most difficult operations. The handling of fine wire and soldering so that the work would fit in closely adjusted units, demands a boy who is sensitive to delicate mechanism; and equally important, a boy must not lose time. Mr. D. W. Castle thinks that boys select work of this kind themselves as the supply of places is greater than the number of boys prepared to qualify. Supplementary training is given each boy in the telephone organization.

There is an outstanding work in the room marked Building Trades. I saw bricklayers producing flues and fireplaces. Carpenters were doing all of the various kinds of framing from their own drawings and models. These models to one-eighth size were so well made that they looked like the work of expert craftsmen. The local contractors won't let the boys complete the course. The troubles of securing an apprenticeship are a minimum when a boy can show what he can and wants to do. Any architect or contractor would envy the library of books and the up-to-date file of leaflets and catalogs. Estimates can be checked and theories provided, for there is every type of construction near the school. The next generation of Mortonians ought to be the model builders of America.

The lights blinked and then had to blink again, as folks moved slowly toward the door and home. Perhaps the most effective appreciation I heard came from a man, pointed out to me as a metal polisher, who went out as I did. He was saying to his son—one of the co-ops: "You want to get everything in your head that you can." And the boy answered: "You bet!"—*Robert B. Bagby.*

ANSWERS

(See page 268.)

1. Boston, Mass. 1877.
2. "The National Society for Vocational Education" and "The Vocational Society of the Middle West."
3. 1917.
4. Detroit, Michigan.
5. Los Angeles, California.
6. Goldberger and Davis.
7. Preparation, presentation, application and testing.
8. Charles R. Allen.
9. Wisconsin.
10. R. W. Selvidge, of Missouri.
11. L. H. Dennis of Pennsylvania.
12. Dr. Charles A. Prosser, of Minneapolis.
13. Orthogenic.
14. General shop or household mechanics.
15. Cooperative industrial.

AN OPEN LETTER

To the Officers
Eastern Arts Association
Western Arts Association

Gentlemen:

Your annual conventions for 1927 have come and gone.

Both meetings were most successful in point of program, attendance, local interest, and exhibits. Both were professionally and educationally constructive. They did not, however, show that vitality and determination to accomplish which your new and big brother, the American Vocational Association, showed at its last meeting. With a splendid history and many years of unselfish leadership, both your organizations, the Western Arts Association and the Eastern Arts Association, seem to have halted on the road of progress.

Will you permit this comment entirely in the spirit of helpfulness and in the help we may enlist from the rank and file of your members? If many minds are started suggesting definite things for the consideration of the officers, results will follow in due time. After all, public opinion stimulates progress and the members of both associations have opinions which deserve consideration.

Frank Mathewson, the very able and self-sacrificing secretary-treasurer of the Eastern Arts Association, estimates that the supervisors and teachers of art and industrial arts in the territory of the association number 30,000. Of this great prospective membership the high-water mark of 1,500 has been reached after more than 25 years of activity. The estimated number of teachers in the territory of the Western Arts Association is 25,000, but the actual membership of the organization is only 1,600.

Has the time arrived when the membership in the Eastern Arts Association will be sought and honored and considered a mark of distinction? Can membership in the Western Arts Association be made a real professional asset to its holders? In medicine, law, architecture, engineering, the memberships in the professional associations are an honor and have a distinct professional value. Can the organizations of art and industrial-arts teachers be given standing and influence like those of the American Bar Association, the American Institute of Architects, the American Medical Association, and the various national engineering societies? Each of these bodies sets up standards of membership as a requisite to election, and each has a higher grade of membership—fellowship or life membership—which is a distinct honor conferred by the entire group for outstanding personal merit or service. Can the Eastern and Western Arts Associations set up standards of membership that would have professional value?

It would seem that a start might be made in the direction of membership classification. To set up qualifications or tests for membership seems too hazardous to be even suggested. But it would seem that executives in city and state school systems, professors in universities and colleges might well be classified for a higher rate of annual dues. Life memberships might well be advocated for those who have attained some distinction in the field and are able to pay a reasonable lump sum in lieu of annual dues. Perhaps some funds might be set up in honor of men and women like Hugo Froelich, Bonnie Snow, James Parton Haney, and perhaps some of the early pioneers, to perpetuate their names and to provide income for management, promotional work, and research. The active membership in the associations should be not less than five dollars per year and should be made worth that sum in service and publications. A lower local registration fee for local or temporary members would assure local support and give persons not entirely eligible for membership the advantages they now enjoy.

But the problem of financing is perhaps too large to be discussed here. It might be added that the manufacturers of supplies and the publishers of books could well support the associations more liberally. A representative exhibit of art and industrial-arts products at each convention can be made complete only by an equally representative exhibit of books, materials, supplies, and equipment. The commercial exhibit is an essential complement of the school exhibit. But any exhibit must be planned and managed so that school displays can be studied and the commercial houses must have an opportunity to benefit to the extent of their outlay of time and money. The Philadelphia exhibit on a balcony was most unfortunate. A larger income from exhibits can best come from paid management and will in turn insure such management.

Did I say paid management? May we ask another question? Is it fair to allow Frank Mathewson and Ray Fell to work as they do for the Eastern Arts Association and the Western Arts Association? Yes, they take the initiative and make a sacrifice of time, labor, and money. Is the splendid willingness of these two unmatchable fellows to be imposed upon so much longer? A trade association would pay each thousands per year for half the work now done.

But the cry comes: "we have no money." Increased dues, increased revenues from exhibitors would produce the money to pay these men a "living wage." Suppose we defined the job and offered the salary and then built the Associations to a size comparable with the importance of our work. Economies might well be effected in the program. There is much useless expense in building programs. The department of superintendence of the N. E. A. spends nothing for program. The Eastern Arts Association set up a budget of $1,600.00 for the Philadelphia program and the Western Arts Association a similar amount. Can such expenditures be justified for the present size of the associations?

After all, it's a problem of organization. The management is excellent in both organizations. The president of each association should build his or her own programs. Local committees should not be expected to defray expenses, chargeable to the association proper. But that is all a matter of detail. It's a problem of organization, and this open letter is written not to criticize, but to build. It takes no genius to destroy. The Eastern and Western Arts Associations maintain the nucleus of splendid organizations. May we express the hope that fearless innovations of policy will build both organizations into worthy servants of a splendid cause.

FRANK BRUCE.

THE BUILDING OF A COLONIAL BUNGALOW IN EVERETT, WASHINGTON

The accompanying photograph shows a colonial bungalow built by the Smith-Hughes carpentry class of the high school, Everett, Washington. The house was built last year and was finished in time to be used as a demonstration home for "better-homes week."

The bungalow which is in colonial design, is 26 by 40 ft. in size, with a full basement. On the first floor, there is a large living room 13 by 26 ft. in size, two bedrooms, a kitchen, a dining-room, a breakfast room, and a bath. On the second floor are two medium-size bedrooms.

The plans for the bungalow were drawn by two members of the architectural-drawing class and were submitted to the owner for approval. They were revised until the final plan was accepted. The carpentry work, from the cement forms to the inside finish and built-in cabinets, was done by the boys of the carpentry class, under the supervision of Mr. L. A. Jacobsen, instructor in carpentry. The other work, such as cement mixing and pouring, brickwork, plumbing, lathing and plastering was done by outside labor. The wiring and fixture work was done by the owner. In earlier houses, the wiring had been done by the Smith-Hughes class in electricity.

This is the tenth house to be erected by the carpentry class since its organization in 1917. Other work completed includes several garages, portable buildings, and a school play-shed. The next project in carpentry will be a small hospital building for the local orphanage.

Under the arrangement, the boys work for the experience and receive nothing in compensation, except their credit toward graduation. The owner receives the direct benefit in free labor in the construction of the house.

The school day for the carpentry class is devoted to both theoretical instruction and shop practice. The academic classwork begins at 8 o'clock, with the first hour spent in related theory and mathematics, which includes the principles to be applied on the job. The boys figure lumber bills and order the materials as a part of the related work in mathematics. Three hours are then spent on the job in actual construction work. The class period ends at 12 o'clock, leaving two periods of the day for academic work.

THE COTTAGE READY FOR A TENANT.

HELPING THE MANUAL-TRAINING TEACHER

Dr. J. I. Sowers, director of the department of vocational education at Miami, Florida, has developed a complete plan for aiding teachers in the service to grow professionally, and to overcome their difficulties in the way of professional preparation. Dr. Sowers believes that it is an essential part of the superintendent's theory of the school system to keep teachers regularly in touch with educational growth and with fundamental educational theories. Through his instrumentality, a club including all shop instructors, has been formed and monthly meetings provide an opportunity for discussing problems and interests.

One of the several means adopted by Mr. Sowers for promoting growth is a monthly bulletin which takes up some aspect of shop organization, class management, or teaching method. The following material is taken from a bulletin issued in November and is typical of the discussions:

In order to justify a place in the curriculum and to secure adequate benefits to the student, and to absolve school officials for the expense of maintenance, it is necessary and essential that manual-training work be wisely and broadly conceived, judiciously organized, richly supplemented, painstakingly prepared, and skillfully presented.

The Lesson

The lesson is not an isolated task; it should have a definite relation to that which has gone before, and that which is to come after. It is a cooperative undertaking of teacher and pupil. It is an discriminating questioning and by a clear, accurate statement or discussion of the vital points involved in the demonstration.

Steps in a Demonstration

1. A statement of the definite problems involved in the demonstration.
2. The actual execution of the work proposed in the demonstration.
3. The *summary* of the work done and the points to be emphasized, and the *test* of the student's understanding.
4. Assignment. (This consists of definite instructions to the students for doing the work.)

Immediate Shop Objectives

Speaking of immediate objectives in shopwork, Mr. Sowers distinguishes manipulative from the nonmanipulative objectives. He writes:

When we come to examine our manipulative objectives we find that they are about three in number as—

1. To provide opportunity for boys to make and do things.
2. To provide training in common skills everyone should possess.
3. To provide trade exploratory, or try-out experiences, in typical trades to assist boys in testing their aptitudes and interests.

Nonmanipulative Objectives

1. To provide training in industrial art and in industrial-art appreciation (partly manipulative).
2. To provide a natural medium for guidance, educational and vocational.
3. To provide interesting technical information about the occupations represented in the school, and in the community.
4. To provide studies in vocational economics closely related to everyday life.
5. To provide organized training in reasoning and problem solving.
6. To give at least an initial understanding of the place of drafting and mathematics in relation to trades.

Last year's "Varda" was an experiment, but it was voted a unanimous success. The students took a greater pride in a student production. They appreciated the material presented, better because of its piecemeal appearance. They liked the looseleaf feature because they could easily intersperse pages of photographs and clippings with the very detailed history of the school year. And of course they liked getting three times as much for their money.

The Demonstration

In the beginning of any art it is always a wise policy to put the beginner into possession of such established uses, mechanical operations, and devices as long as experience and study have found valuable. It is this that the *demonstration* attempts to do. This method of instruction gives the student or the novice in a trade, information quickly and exactly that he would otherwise only be able to arrive at after long effort and many costly errors.

There are certain principles by which the demonstration must be guided and certain requirements which it must satisfy in order to fulfill the purposes and meet the needs for which it is given. Some of these guiding principles are:

1. The demonstration must be so timed as to meet the immediate needs of the class with the work in hand.
2. It must present a single fundamental use, procedure, or fact.
3. The demonstration must be brief.
4. The work of the demonstration must be skillfully done.
5. The whole performance must be accompanied by concise and essential unit, of an organized body of material, which is to be dealt with at one time. It is the immediate attainable step to be dealt with now. It comes from and uses material in past lessons, and leads to other lessons which are to follow—offering its own contribution to the general plan of a course.

Steps in a lesson:

Presentation — Application
Preparation — Test

Methods of teaching the lesson:

The lecture method
Illustration
Demonstration
Test

Lines of approach in teaching a lesson:

The informational line of approach
The developmental line of approach

(Note: "*Lines of approach*" refer to the policy of the instructor in handling a lesson or any steps in a lesson. "*Teaching methods*" refer to the particular devices that may be used under either line of approach.)

VOCATIONAL EDUCATION SOCIETY OF BOSTON

The annual outing and business meeting of the Boston Vocational Education Society was held May 14, at the Essex county Agricultural School, Hathorne, Mass. For the first time in years the outing was made a "ladies' day," and many of the members were accompanied by their wives. The occasion gave excellent opportunity for gaining acquaintance with two types of vocational education with which the average shopman had little contact: agricultural and household arts.

The day, threatening in the early morning, turned out to be an ideal one for the twenty-mile drive from Boston, and for the open-air program which ensued. The members turned out to the number of 70, and began to arrive at ten o'clock. Members of the school faculty formed parties and acted as guides, explaining the work of the school and exhibiting its grounds, buildings, and activities. Attractive mimeographed souvenir programs were handed to all the guests. These programs listed the itinerary through the school plant. Inspection was made of the new fruit nursery, of the ornamental gardening division, including greenhouses and outdoor beds, of large and small fruits, flowers, ornamental evergreens, market gardens, and the grafting laboratory orchard. The extensive poultry plant, including several types of incubators, aroused much interest. In the farm mechanics shop most of the guests were upon more familiar ground. Visits to orchards, fields, and dairy and stock barns followed. A "parade" of livestock, and of various types of farm vehicles, greeted the returning parties as they assembled in front of the administration building.

All the guests then proceeded to the homemaking department building. Time was given for a view of the activities carried on here, before the call for luncheon.

The meal was prepared and served by the girls of the department, and compared more than favorably with the "commercial" catering to which the society is accustomed at its monthly luncheon meetings. At its conclusion, the business meeting was held in the assembly hall.

Vice-President Ralph W. Babb presided, in the absence of President Robert E. Baker, who was ill. Mr. Babb read a letter from President Baker, expressing his regret at being unable to attend, and containing reassuring news of his condition.

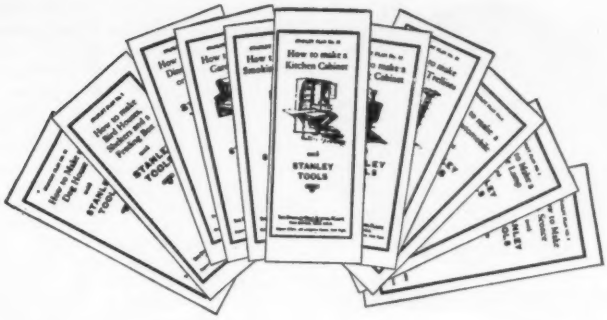
Following the minutes of the previous meeting, the report of the nominating committee was made by Chairman George M. Morris. The nominations, which were unopposed, were: for president, Ralph W. Babb, director of Lynn Continuation School; vice-president, James T. Gearon, director of Everett Continuation School; secretary, Henry A. Bonin, supervisor of industrial courses, Everett High School; treasurer, Willis C. Brown, Boston public schools; librarian, Louis A. VanHam, Mechanic Arts High School, Boston. These officers, unanimously elected, assume their duties at the first meeting of the school year, in October.

New members elected were: Rodney F. Paschal, Medford; Joseph Hackett, Belmont; and Earl E. Gowen, Arlington.

Mr. Chester E. Hammond made a report on the trip taken by 30 members on April 20 to the new Ford automobile plant at Somerville.

At the close of the meeting, Director Fred A. Smith of the Essex county Agricultural School, gave an address, in which he called attention to the unity of purpose which exists in the industrial, agricultural, and homemaking schools. All three, he pointed out, are teaching their pupils usefulness, and have every reason to be proud of their controlling purpose. In discussing the activities of his school, he pointed to a productivity last year in the agricultural department of fifteen thousand dollars, and in the homemaking department of nine thousand. As for the value of the students' products on their supervised home projects, he stated that their value in the past five years has exceeded the net cost to the county of running the school.

In the afternoon a five-inning baseball game was played between a team representing the school faculty, and one selected from among the visitors. As an appropriate ending for a perfect day, it resulted in a victory for "our side," with a score of nine to four.—*Frederick Ames Coates.*



11 New Stanley Plans

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Smoking Cabinet, Plan No. 12

Kitchen Cabinet, Plan No. 13

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Vacation is here. But soon you will be laying out your fall work. These Stanley Plans will suggest ideas and designs for new and interesting projects. Each one contains complete working drawings, stock layouts, list of materials required and list of tools needed to do the work. Possibly you can use them for classroom study and extra assignments. Complete detailed instructions are included to guide the amateur worker.

We invite manual training instructors to examine these plans and use them. A complete set will be sent you free of charge. Your boys can purchase these plans for 10c each, which covers the cost of printing and handling.

You will find Stanley Plans both interesting and practical. Send for a complimentary set today.

THE STANLEY RULE AND LEVEL PLANT
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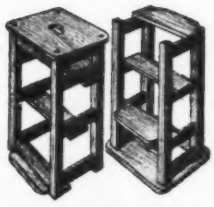
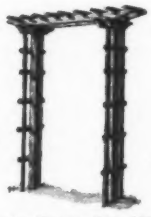
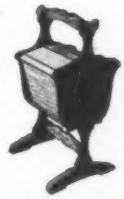


Combination Kitchen Seat and Step Ladder, Plan No. 20



Garden Trellis, Plan No. 22

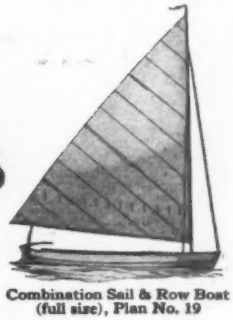
Garden Seat, Plan No. 21



Sewing Cabinet, Plan No. 14

End Table, Plan No. 16

Tea Wagon, Plan No. 17



Combination Sail & Row Boat (full size), Plan No. 19

STANLEY
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STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

Some people think the point of a drill is the extreme tip of the cutting end!

Actually, that extreme tip is known as the "Dead Center"—while "The Point" is the *entire* cone-shaped surface at the cutting end. All that you see in the illustration above is "The Point."

This is only one of the many interesting and instructive definitions to be found in the Handbook for Drillers. In it every part of a twist drill is clearly and simply described—plus a great deal of useful information on grinding, cutting speeds, feeds and how to secure the best results when drilling in various metals.

Vocational Directors and Instructors are invited to ask for copies of the Handbook, in any reasonable quantities, for the use of their machine shop classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK·CHICAGO·LONDON

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Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose; "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Ezy-Out" Screw Extractor.

NEW BOOKS

Instructional Units in Wood Finishing

By R. A. McGee and A. G. Brown. Cloth, octavo, 128 pages. Price, $1.60. The Bruce Publishing Co., Milwaukee, Wisconsin.

It is trite to say that finishing of projects made in school woodwork shops has been an important, but rather neglected, phase of shop instruction. Information on materials and processes has been scattered and scarce, and wide differences of opinion and practice concerning kinds of finishes and procedures have been common.

The present book is the result of some years of teaching wood finishing to high-school students and young men in teacher-training classes. One of the authors has been a journeyman in the trade and has had experience in the chemistry of paints, etc. Both authors have had experience in teaching the subject.

The book covers all the basic types of wood finishing commonly in use and emphasizes especially the finishes used on furniture, interior walls, and woodwork. As the title indicates, the material is presented in the form of instructional units so that teacher and student may follow a single type of finish through to completion. Processes are very clearly described and illustrated, and necessary information on tools and materials is introduced as needed. The book thus combines the best features of instruction and job sheets and provides for a maximum aid for individual as well as class instruction with a minimum of confusing detail and generalized information. The fourteen units take up a sufficiently wide range of work to meet any junior- or senior-high-school needs.

In wood finishing of any kind the routing of the job and the sequence of operations and materials at proper time intervals is all-important. The authors have recognized this fact and have emphasized it in each unit. To provide for typical finishing jobs they have provided eleven typical routing orders in an appendix and have added blanks so that the student may record successful procedures which he has used.

Simplified Roof Framing

J. Douglas Wilson and S. O. Werner. Cloth, 122 pages. Price, $1.40. McGraw-Hill Book Co., New York, N. Y.

This book has been written with a somewhat different object from that of most of the books published on this subject. It is the aim of the book to teach the principles of roof framing to mechanics who are without a working knowledge of mechanical drawing, geometry, or trigonometry.

The subject matter has been given a thorough tryout in evening-school work and has proved successful in use. It is especially applicable to the field of industrial education which is being developed in the modern high school.

The material in the book has been arranged in such a way that each chapter treats a particular roof, while each section of the chapter treats a rafter. It is, therefore, possible to study either a complete roof or simply a rafter as desired. The book takes up such topics as terms, types, and principles of roof framing; the gable roof; the hip roof; intersecting, and unequal-pitch intersecting roof. One chapter is devoted to special rooms. There is a complete index to the work covered.

The book will be found a means of promoting industrial education in trade and high schools and will also prove of interest and profit to the mechanic already engaged in the fascinating work of building construction.

Manuals for Hand Woodworking

Books I and II. By DeWitt Hunt. Book I, Cloth, 144 pages; Book II, cloth, 165 pages. Published by the Harlow Publishing Co., Oklahoma City, Okla.

This book does not replace the regular reference books but it outlines a subject for study and discussion for each lesson of the school year.

The book comprises 36 pages devoted to problems and processes in hand woodworking and includes thirteen plates of typical woodworking projects. Four chapters of the book are devoted to rafter cutting and one to saw filing, making the work suitable for use in farmshop classes. There are a number of tables to be used in connection with the estimating and cutting of material.

Book II is a companion volume to Book I. It takes up the study of tool processes and related subject material in connection with wood finishing and painting. Material is offered on the subject of structure, growth, and seasoning of woods and practical suggestions are given relative to shop organization and upkeep. A series of twelve plates show typical problems in woodworking. One chapter is devoted to glues, one to fire prevention, and one to benches and drawing tables. It is suggested that the teacher assign considerable outside work in order that the student may acquire a good knowledge of the subject matter which is related to shopwork.

The Whale Ship

By Joseph T. Higgins. Cloth, 36 pages. Price, $4. The Rudder Publishing Co., New York, N. Y.

This book is the latest edition to the growing list of works on ship-model making which is so popular at the present time. The book presents rather inclusive information on old-time American whale

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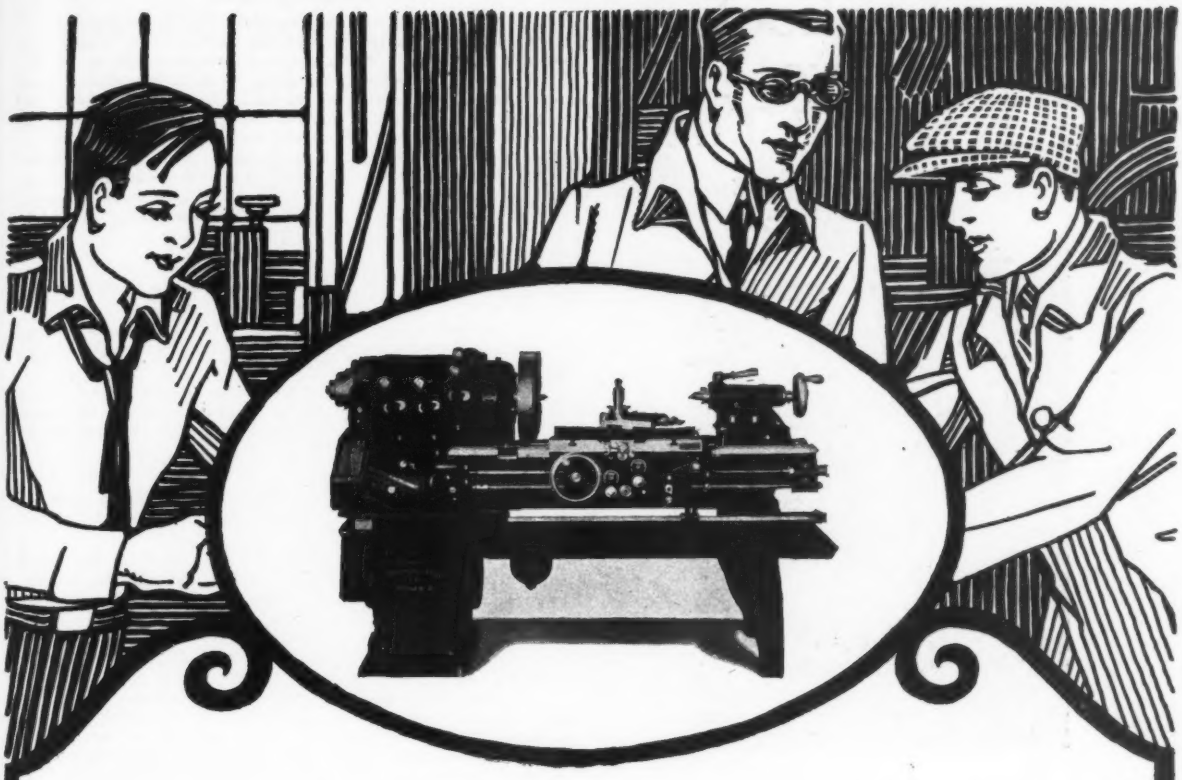

Train Your Students for Their Jobs — Use MONARCH LATHES

Train your students on MONARCH LATHES and when they go from your school they will be ready for their jobs —valuable men immediately without the necessity of going through another period of training in the shop.

The student that is trained on a Monarch Lathe is trained in actual shop practice — for the Monarch is the first choice of Industrial America. Today more Monarch Lathes are being sold to industrial plants than any other lathe built.

The Monarch motor-driven, helical geared Lathe is the ideal equipment for instructional purposes. It is far in advance of other lathes in design. It is as near danger-proof as any lathe can be made. It is as noiseless as any lathe can be—an important advantage in the instruction room.

Monarch Lathes are used in the Massachusetts Institute of Technology, Yale, Cornell, and in hundreds of the best technical and high schools — proof that the Monarch is the practical lathe for modern school equipment.

The success of your school and the success of your students are inseparably linked together. Use MONARCH LATHES and meet the modern demand for training that *fits men for their jobs.*

Illustration above shows 14 x 6 helical geared Monarch Lathe

THE MONARCH MACHINE TOOL CO.

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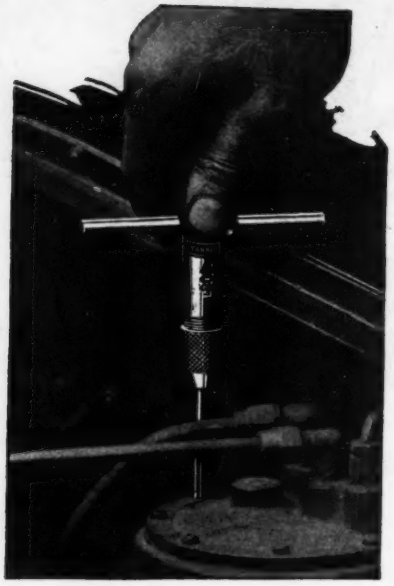

Where Tapping Looks Difficult

Here's a tapping job that looks difficult. A complete turn cannot be made. Something could be moved—that takes time. But it's easy with a

"YANKEE" Ratchet Tap Wrench

In this case, the mechanic simply set the Ratchet Shifter to give him right-hand ratchet.

Then, by turning the cross bar back and forth, he quickly finished the job.

No matter where the hole is you can tap it with this handy tool.

Three adjustments. Right-hand Ratchet, Left-hand Ratchet and Rigid. Knurled finger turn at top quickly starts or backs out taps.

No. 250—Length 3¼ in. Chuck diam., ¾ in. Holds up to ⅛ in. taps.

No. 251—Length 5 in. Chuck diam., ⅞ in. Holds up to ⅛ in. taps.

No. 1251—Length 13 in. For jobs needing long reach. Otherwise same as No. 251.

Some other "Yankee" tools

Ratchet Screw-drivers — Automatic Push Drills
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NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

(Concluded from Page 26a)

ships, and includes accurate and complete detailed drawings of two typical ships of the middle of the last century. The models have been reproduced from photographs and accurate models of the two ships found by the author in museums. Careful comparison of other models found in museums and in the homes of owners have been added so that the work is authentic, true to scale, and sufficiently typical of the best practice of the time and of this type of ships.

The book gives a good idea of the methods used in old-time shipbuilding and offers considerable practice in boatbuilding, woodworking, and cabinetmaking construction. It should prove of interest to students taking building construction and woodworking, and should be of immense help to the home model-ship builder.

Shop Tests

By William L. Hunter. Paper, price twenty-five cents in lots of 25. Published by the Manual Arts Press, Peoria, Ill.

A collection of fifteen selected tests for use in woodworking, carpentry, machine-shop practice, mechanical drawing, micrometer reading, electricity, and auto mechanics.

Each sheet shows the tools or parts related to the subject, gives a list of questions to be answered, and offers directions for conducting the test. Space at the lower right-hand corner is reserved for the pupil's name, grade, school, and number.

Practical Wood Carving

By Eleanor Rowe. Second edition, Part I. Flexible cloth, 92 pages. Price, $1.25. The Bruce Publishing Company, Milwaukee, Wisconsin.

This book is the second edition of a text which has been found useful in schools and in the shops for beginners in craftsmanship. The volume comprises all the necessary information for a beginner, as well as the preliminary instruction for high-relief carving. It will be found useful to those who need an inexpensive manual and will aid in bringing out the initiative of the student in producing patterns which are properly the product of the tool.

The book opens with a description of a minimum wood-carving outfit and the various woods usually used by the wood carver for furniture, interior woodwork, etc. There are chapters on the construction of various joints, on chamfering and gouging, flat carving, strapwork, panels and pedestals, and modeling in high relief. The designs are adapted to a wide variety of furniture and building trim. The book contains an index and an appendix for the convenience of the student and teacher.

Essentials of Metalworking

By Edward Berg and B. E. Wing. Cloth, 160 pages. Price, $1.32. Manual Arts Press, Peoria, Ill.

There has been a need of a simple text outlining the tools and processes of bench metalwork, and describing the common means of shaping, fastening, and heat treatment of metals. The present book amply fills this need and supplies, in addition, chapters on the properties and uses of common metals, their manufacture, and commercial forms. Each topic is treated as simply and clearly as possible for beginners and young students and ample use is made of illustrations to convey ideas which alone cannot reveal. A series of standard tables of facts useful for machine shop, sheet-metal working, and heat treatment is added.

Arithmetic Practice

For fourth and fifth grades. Book one, paper, 132 pages; book two, paper, 119 pages. Published by the Macmillan Company, New York, Chicago.

These booklets have been prepared for use in determining and correcting weaknesses in the step difficulties of the arithmetical processes. They are intended for optional use with McMurry and Benson's social arithmetic but are usable with any basal text.

The Place of Vocational Agriculture in the Present Agricultural Situation. By C. H. Lane. Monograph No. 3, December, 1926. Issued by the Federal Board for Vocational Education, Washington, D. C. The monograph is a reproduction of an address delivered by Mr. Lane at the four-state vocational conference held at Chester, Pa. The pamphlet discusses efficient farm organization, adjustment of crops and livestock, low-cost-production practices, standardization of products, and orderly marketing.

Engineering as a Lifework. By J. V. Lynn and E. S. Baird, Issued by the Extension Department of Iowa State College, Ames, Iowa. This is a revised edition of a former pamphlet which is for the use of vocational counsellors in high schools. The pamphlet is divided into two parts: Part I takes up the need for vocational guidance, the use of tests, prevocational training, and occupational studies. Part II takes up a study of the engineering profession, the opportunities offered, the compensation, and qualifications for entrance into the profession. A very good bibliography is included, which is intended to be suggestive as topics for discussion in vocational-guidance meetings.

The Sargent Auto-Set is better than the ordinary plane for manual training classes

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IT PAYS to give students tools that are good. It pays to give them Sargent tools. Sargent tools are strongly made and stand up under punishment. They are long lasting, yet moderately priced. They are carefully and accurately made.

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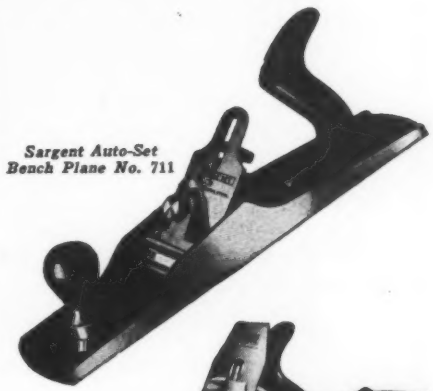

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SCHOOL SHOP EQUIPMENT NEWS

ISSUE NEW BOOK ON TOOLS AND TOOL PROCESSES

The Stanley Rule and Level Company, of New Britain, Conn., has issued a new book of 179 pages, entitled "How to Work With Tools and Wood." The book is intended for use in the school and home workshop and it tells how to use and care for tools, how to perform the various tool processes in woodworking, and how to make simple repairs about the home. The book is illustrated with halftone cuts and working drawings and there is a complete index to the material included in the text.

The book is another text to be added to the collection of helpful shop material issued by the Stanley Company. It should prove a helpful reference book for every teacher and pupil in shopwork.

CARTER SHAPER MOUNTED ON PEDESTAL

The R. L. Carter Co. of Phoenix, N. Y., have still further developed their ¼-h.p. shaper by mounting it on a pedestal, thereby making this shaper a more versatile machine. The pedestal is of the proper height, making it convenient for the operator, easy to move from one end of the shop to the other. It also permits various difficult operations by merely tilting the motor underneath the pedestal.

With this pedestal construction the angle of the shaper shaft

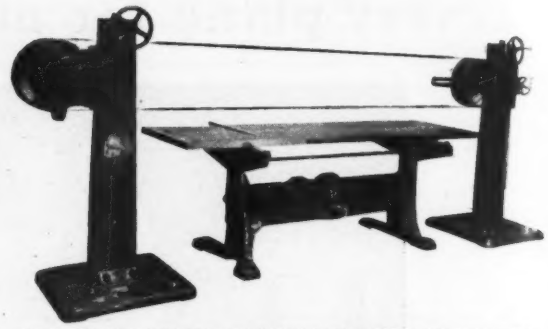
THE CARTER PEDESTAL SHAPER.

may be adjusted in relation to the table to allow a wide variety of difficult cuts to be made by one cutter with a high degree of safety. Moreover with the addition of a jointer knife, the straight gauge may be used as a jointer table. Hence this machine may be used as a jointer as well as a shaper in a small school woodshop or as an auxiliary machine in a large school shop.

OLIVER REVERSIBLE BELT SANDER

The Oliver Machinery Co. of Grand Rapids, Mich., have developed the No. 183-D Reversible Belt Sander in addition to their other sanding machinery. This machine is so constructed that the pulleys may run above the table, which permits the sanding to be

OLIVER SANDER: PULLEYS RUNNING UNDER TABLE.



NEW OLIVER SANDER ADJUSTED FOR PULLEYS TO RUN ABOVE TABLE.

done with the bottom space of the belt; or they may be run below the table, the sanding done with the top span of the belt.

The sander is of a direct-drive type, driven by a 2-h.p., 900 r.p.m., motor. Two pulleys 16-in. diameter and 7-in. face are of aluminum. These are attached to two separate columns on independent floor plates. The floor plates are far enough apart to permit a long sand belt to be used; this insures a long life to the sand belt.

The sand table rolls on ball bearings mounted on an independent base. This table may be raised or lowered by the means of a hand wheel. An idler pulley with ball bearings takes up the stretch of the belt, and tracks the belt on the pulleys.

The machine is completely standardized, of fine construction, and should be of interest to shop teachers who have large sanding problems which cannot be handled on the smaller type of sanders.

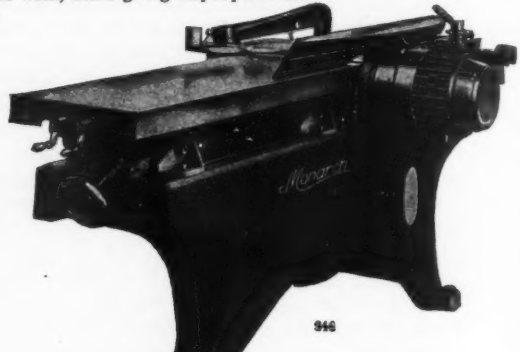
THE MONARCH 12-IN. BALL-BEARING JOINTER

The Monarch 12-in. ball-bearing jointer manufactured by the American Saw Mill Machinery Company, is one of the most modern direct motor-driven jointers placed on the market.

The jointer is of a three-knife motorized head construction in which are fastened high-speed steel knives. The frame is of one-piece construction, with three legs so placed to allow the operator ample leg room.

A table that is heavily ribbed, provided with steel lips, and so constructed that it may be tilted to an angle of 5 deg. for taper work is helpful to the operator when taper jointing is done. Moreover, the table is constructed to permit rabbeting.

The fence has an interesting feature in that it has positive stops for two positions. A good safety guard is provided on the machine. This guard covers the knives at all times; the guard slides close to the work, hence giving ample protection.



NEW MONARCH JOINTER.

The machine may be converted from belt to motor, or from motor to belt drive. Provisions are made so that any exhaust system may be attached to the chute on the jointer.

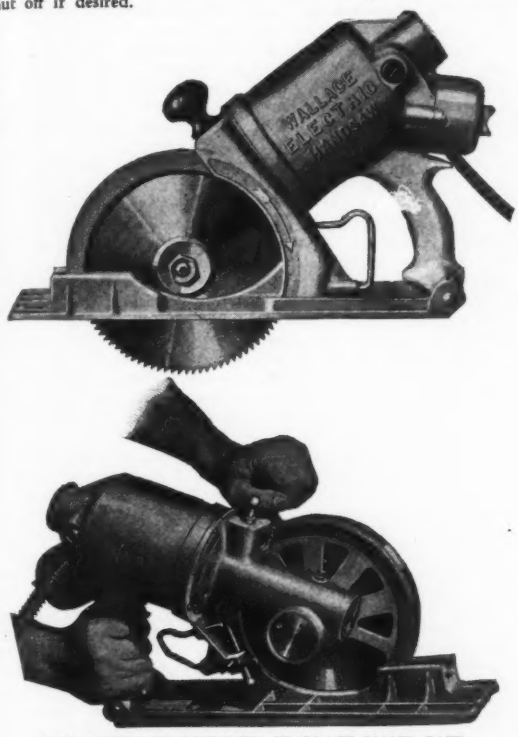
WALLACE ELECTRIC HAND SAW

The J. D. Wallace Co. of Chicago have developed a new electric hand saw with which a variety of saw operations may be performed. The saw is so constructed that it can be used as a cut-off saw, grooving saw, for dado work, in fact for most any operation that any hand saw will perform.

(Concluded on Page 33a)

(Concluded from Page 30a)

The saw is efficient, powerful, and safe to operate. It is so guarded that only when the operator releases the guard will the saw show above the guard. Moreover, the saw is operated on the order of pushing a plane, hence one has full control of the saw at all times by securely holding it in place and with the push-button switch conveniently mounted near the left thumb the machine may be easily shut off if desired.



TWO VIEWS OF THE NEW WALLACE HAND SAW.

The machine is of ball-bearing construction and drives an 8-in. diameter saw. A splitter follows in the saw kerf which helps guide the machine, and with the aid of an indicator in front it is easy to guide the saw to the line desired to cut.

NEWS AND NOTES

Building-Trades Course at Boonville. A building-trades course has been introduced at Boonville, Missouri, under the direction of Mr. G. W. Morris. Mr. Morris has served an apprenticeship in carpentry and has taken special courses under Dr. Selvidge of the University. Additional woodworking machinery has been purchased, making a first-class combination carpentry and cabinetmaking shop.

Housebuilding Project at Springfield. At Springfield, Missouri, the vocational authorities faced the problem of just how to present the practical side of the vocational building-trade work. Should it be done in a shoproom, or should it be carried on by means of an outside project, or both. After a period of five years in which various methods of procedure have been tried out, the Springfield authorities have adopted a method which they believe is practical.

With the beginning of the present year, the school authorities adopted a means of financing actual building that is believed to be the solution of the problem. Through the generosity of a real-estate man, permission was given to build a house and garage on one of his properties. Under the arrangement, the real-estate man furnished all the materials necessary to complete the buildings, drives, and walks. Both the owner of the ground and the lumber dealer were to be paid when the house was sold.

It was decided to build a small three-room bungalow. The use of composition inside enabled the boys to do everything in connection with the building, except the plumbing. During bad weather, the class put in its time making built-in features. The class in electric wiring installed the electrical service in both the house and garage, while the classes in painting did the painting, planted the shrubbery, and landscaped the lot.

The work was all done by average boys, that is, most of the boys had very little or no practice in the use of woodworking tools or building material. Some of them had had seventh-grade manual training but most of them were in the ninth grade.

Window-Trimming Course at St. Joseph. The vocational evening school at St. Joseph, Missouri, has had a number of interesting courses. A class in window trimming and decorating has been

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Your students will be enthusiastic about the "Wonder" and it will prove to be the best machine "educator" you can add to your classroom. Send for special charts showing 25 superior features—sent Free.

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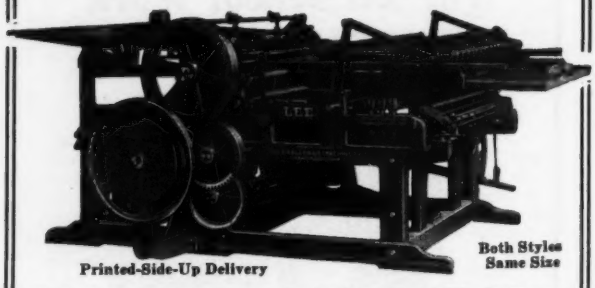

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introduced with considerable success. The course begins with the basic principles in design, proportion, and color harmony, and is carried out without the use of a textbook. Among the various types of windows studied and arranged are shows, drugs, women's ready-made clothing, millinery, men's clothing, and hardware. The merchants cooperate by allowing the classes to decorate and trim their windows. The advanced course is a continuation of the actual window display. Other popular courses are steel square, architectural drafting, automobile storage batteries, and radio mechanics.

Foreman Conference at Herculaneum. The building-trades shop at Herculaneum, Missouri, is a pioneer in the foreman type of industrial education. Mr. Biddick, the instructor, has made his shop a vital force in the community. The fact that Mr. Biddick has been able to find community jobs for instructional projects indicates that the industries are in sympathy with the work.

New Vocational Department at Mexico. The board of education at Mexico, Missouri, has completed a senior high school which provides two rooms for the woodworking and metal-working courses.

Prize Competition Held. The manual-arts section of the Ontario Educational Association, at its recent meeting in Ontario, held a prize competition on the design and construction of a waste-basket. Prizes consisting of books on the manual arts, were awarded to the successful contestants. The competition will be repeated next year and will include more than one type of article. The winning design was of oak and consisted of eight slat sides, tapered and fastened to the bottom with brass screws. At the top they were fastened by means of hammered-brass links bent through small mortises in the slats. The decoration was a panel showing a view of a sailing vessel. The background was lowered and filled with bronze to match the brass links.

Ontario Manual-Arts Section Meets. The Ontario Manual-Arts Section held a meeting on April 19. Mr. F. W. Pugh of the Kitchener Vocational School, spoke on Productive Methods in Manual-Training Shops; Mr. A. T. Wilke discussed Manual Training in Self-Contained Centers; Miss Annette Marsh talked on Arts as Related to Crafts; Mr. E. H. Thomas led in a discussion on the prize competition and presented some art criticisms on the designs submitted; Mr. Arthur Styles brought a message from the Ontario Training College at Hamilton; Mr. T. T. Carpenter demonstrated methods of constructing and coloring stage scenery; Mr. F. J. Tench discussed the problem of the fast and slow boy in the standardized course of study, and Mr. G. B. Cairns demonstrated the use of two decorative materials, enamel transfers and wood-fibre ornaments.

Summer Courses in Sweden. The Institute of Manual-Training at Naas, in western Sweden, will offer two series of courses this summer; one from June 6 to July 16, and another from July 21 to August 30. Each course combines theoretical with practical instruction and the subjects are training men and women teachers in woodwork and metal work. There will also be courses in drawing, modeling, and weaving.

Forest Fire Prevention Handbook. The U. S. Forest Service has recently issued a publication entitled "A Forest Fire Prevention Handbook for the Schools of New Mexico," which is intended for the use of teachers in the New Mexico schools. It offers suggestions for interesting pupils in the forests of the state and their protection. The handbook is arranged in five lessons, setting forth in clear and simple manner, the extent and value of the forests and their importance to the state. It tells how fires may be prevented and how to discover and combat fire in the forests.

Home-Economics Museum Exhibit. The San Antonio public schools use the Witte Memorial Museum of that city for educational exhibits. The home-economics department recently conducted a two-weeks' display with rotating exhibits from the various schools. Negro students arranged an elaborate wedding feast with a huge wedding cake as the central decoration. Other schools gave table-setting demonstrations, caterer's work by boys' classes, as well as a comprehensive exhibit representing both food and clothing study.

Approve Industrial College. The Texas Senate has approved the establishment of a State Industrial College at Tyler. The bill carries no immediate appropriations.

Rug-Design Contest. Students in the San Antonio schools competed in a rug-design contest in which valuable prizes were offered by M. J. Tashjian, collector and importer of New York. A rug-museum exhibit was studied by the art classes and lectures were given to interested groups concerning materials, colors, weaving, and design.

New School at Brenham, Texas. A bond issue in the amount of $180,000 was approved for the building of a high school at Brenham, Texas. The building will include departments of industrial arts, home economics, and probably agriculture and commerce.

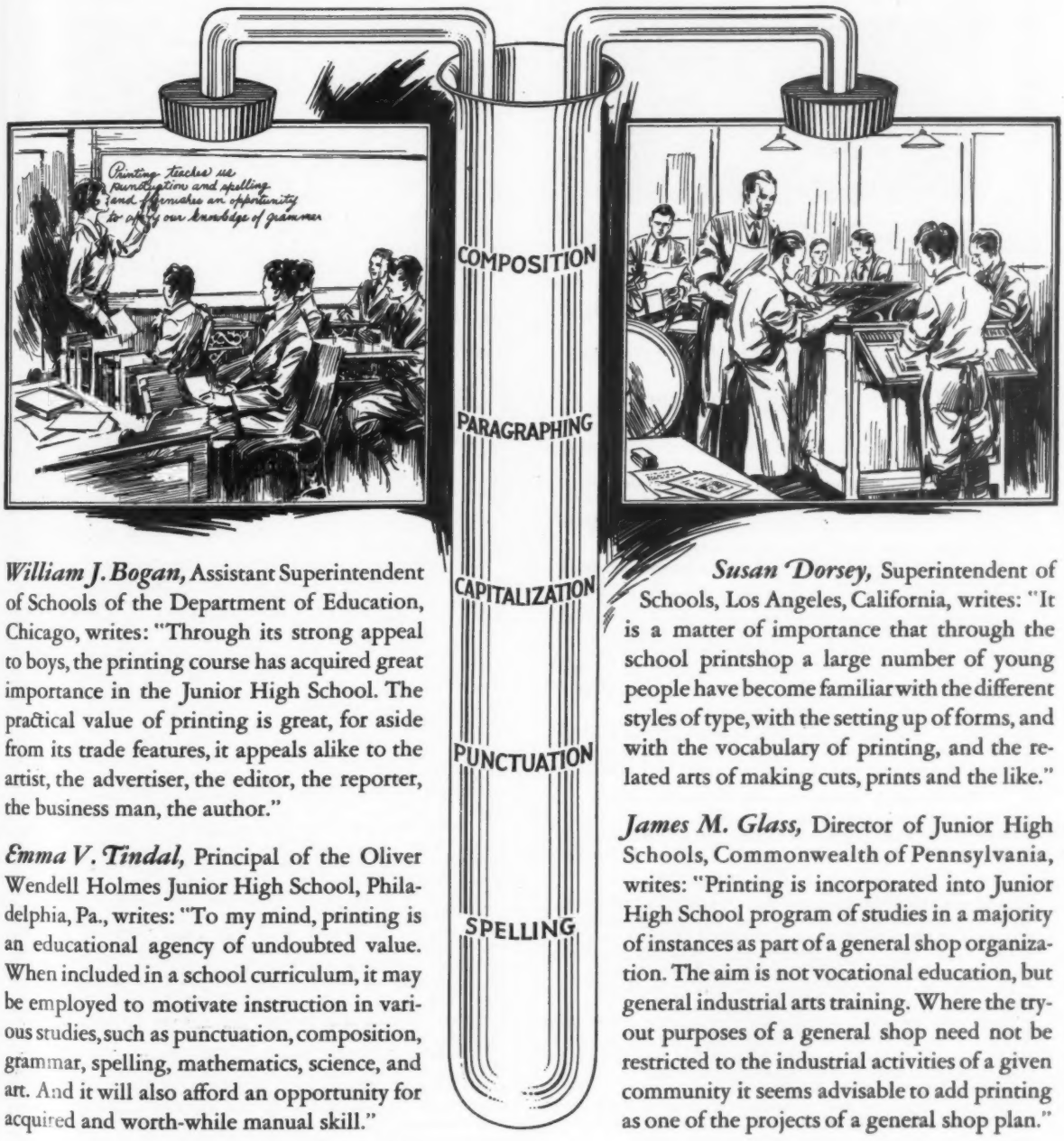
Red Cross First-Aid Instruction. During April the American Red Cross instruction car visited a number of Texas cities, giving instruction to school children in first-aid methods. Special talks were given to shop classes concerning industrial hazards and aid in case of accident.

State Board Meets. At a meeting in Austin, Texas, in April, the state board for vocational education approved a detailed plan for the conduct and organization of home-economics education.

(Continued on Page 36a)

THE TEST OF PRINTING

The Conclusions of Prominent Educators



William J. Bogan, Assistant Superintendent of Schools of the Department of Education, Chicago, writes: "Through its strong appeal to boys, the printing course has acquired great importance in the Junior High School. The practical value of printing is great, for aside from its trade features, it appeals alike to the artist, the advertiser, the editor, the reporter, the business man, the author."

Emma V. Tindal, Principal of the Oliver Wendell Holmes Junior High School, Philadelphia, Pa., writes: "To my mind, printing is an educational agency of undoubted value. When included in a school curriculum, it may be employed to motivate instruction in various studies, such as punctuation, composition, grammar, spelling, mathematics, science, and art. And it will also afford an opportunity for acquired and worth-while manual skill."

Susan Dorsey, Superintendent of Schools, Los Angeles, California, writes: "It is a matter of importance that through the school printshop a large number of young people have become familiar with the different styles of type, with the setting up of forms, and with the vocabulary of printing, and the related arts of making cuts, prints and the like."

James M. Glass, Director of Junior High Schools, Commonwealth of Pennsylvania, writes: "Printing is incorporated into Junior High School program of studies in a majority of instances as part of a general shop organization. The aim is not vocational education, but general industrial arts training. Where the tryout purposes of a general shop need not be restricted to the industrial activities of a given community it seems advisable to add printing as one of the projects of a general shop plan."

FOR INFORMATION REGARDING PRINTING INSTALLATIONS, WRITE

F. K. PHILLIPS, *Manager,* EDUCATION DEPARTMENT

AMERICAN TYPE FOUNDERS COMPANY

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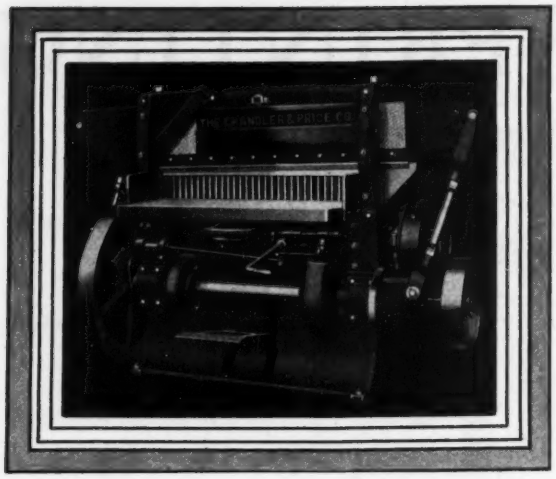

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—how heavy it is, and how rigidly it is built;

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Binder and knife return immediately to position, where they are absolutely locked against repeating. Automatic safety stops prevent knife from making more than one cycle. A new cycle cannot be commenced until two separate movements of lever —one upward and one circular—are made all over again.

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The CHANDLER & PRICE CO., *Cleveland, U.S.A.*

EXHIBITOR
GRAPHIC ARTS EXPOSITION
New York *Sept. 5-17, 1927*

(Continued from Page 34a)

New Building. The high school at Kingsville, Texas, was recently burned and industrial-arts equipment totally lost. A $135,000 plant is being rebuilt with provisions for home economics and future replacements.

Junior Dressmaking Contest. Department stores in San Antonio, Texas, have encouraged interest in clothing study for junior girls by means of a junior dressmaking contest for girls 6 to 12 years old. The contest took the form of a public-school competition. The judges awarded prizes on the basis of neatness in sewing, the correct following of patterns, and selection of materials.

Welding Conference Held. Under the auspices of the North Texas Agricultural College, Arlington, a spring welding conference was recently held. Topics discussed by expert welders included general relation of welding to industry, pipe-line welding, training of welders, dissolved acetylene, welding equipment, arc welding, gas regulators, motion pictures on welding and Tobin bronze, and welding instruction as a part of education. An exhibit included the latest welding equipment and demonstrations of its use.

Vocational Guidance in Art Training. In a cooperative arrangement between the Witte museum and the junior high schools of San Antonio, Texas, a vocational-guidance experiment was conducted by Miss Aline Rather, art supervisor, and Xavier Gonzales, artist. Two art students from each junior school were given special art instruction at the museum without additional charge. The class now includes 22 students who have shown unusual talent in this branch of schoolwork.

The printing industry of New York City has petitioned the board of education of that city to provide a building devoted to the teaching of printing, at a cost of $2,500,000. The committee of petitioners suggested that the plan of operation of the various schools to be installed in the new building should be flexible enough to permit the working out of a cooperative agreement with the various units of organizations represented in the trade, or a continuation of the various agreements now existing between the respective unions and the employers' associations and the board of education. "This request," they said, "is in recognition of the fundamental principle that the public should bear part of the cost of industrial education; that industrial education, to be effective, must be directly related to the needs of the industry it serves; that the industry must, through advisory committees, keep the work of education abreast of the developing needs of the industry."

A printing school is conducted in Baltimore, Md., as a part of the public-school system. It is sponsored by the Typothetae of Baltimore, and is said to be the finest school of its kind in the United States. The object of the school is to develop skilled apprentices with the proper background to become master craftsmen.

Educational Work in the Near East. Mr. Joseph C. Park, of Oswego, New York, who has returned from an extended trip through the orphanages and service centers of the Near East Relief, has presented his observations in a recent report which he made as a result of his visit to these centers.

Mr. Park reports that the Near East Relief has an efficient personnel both at home and on the foreign field, and that the work of this organization in saving life, combating disease, furnishing food and clothing, restoring families and rehabilitating the people is without parallel in the history of the world.

As Mr. Park sees it, the greatest need of the Near East is education. These people must have vocational training to rehabilitate themselves. They must have better homes, better clothing, and more food, and their condition will improve with vocational training and with the aid of foreign capital and technical knowledge.

Printshop Installed at Nevada. A small printshop has been installed in an unused room of the high school at Nevada, Missouri. The printshop was equipped through the efforts of a group of high-school boys and all of their free time is spent in the shop since the curriculum does not include printing. The boys divide the duties of getting out the school paper, the annual, and the reports among themselves, choosing their foremen, and carrying out other duties in connection with the work.

Vocational Trades Courses at Flat River. The schools at Flat River, Missouri, have for the last twenty years offered courses in manual training and domestic science. The courses were made possible through the generosity of the Doe Run Lead Company and have been continued ever since. This year the course in woodwork was given a vocational trend and reimbursement for the course is received from the state and federal governments.

The new vocational courses introduced last fall extend the manual-training courses along the lines of wood and metal work. The courses in house building, house wiring, cement work, machine-shop practice, plumbing and forging are conducted on a trade basis. In the building-trades course a model was made of a building which was being erected for a cafeteria. The models followed the same plan of construction used in the original building and the details were studied by visits and drawn to scale before the model was made. The class made library tables and bookshelves and repaired teachers' desks and chairs.

(Continued on Page 39a)

(Continued from Page 36a)

The cement class built an aquarium for the rock garden. Other activities were the repairing of cement floors, walks and walls, and fountains, sinks, and toilets.

A metal-trades course was established in January with the installation of machinery including motor lathes, vises, forges, drill presses, and the like. The class has begun the making of screw drivers, power jacks, hack saws, and hammers.

One of the largest problems attempted was the planning and construction of a set of takedown bleachers. The woodwork was planned, drawn, cut, and assembled by the house-building-trades class, while the stirrups, hangers, braces, and bolting were made by the metal-trades boys. The set consisted of eight sections and accommodated 1,000 persons. The next project of this department will be the construction of a garage. In this work, the boys will prepare the plans and specifications, the bill of materials, and the blue prints.

Dedicate New Unit of Lathrop Trade School. The Lathrop Trade School at Kansas City, Missouri, held open house on April 19 and 20 as a means of dedicating the sixth unit of the building. The unit was erected at a cost of about $75,000. The new building has made necessary a new lighting and power service to care for the total light and power load in the school.

Boys Build Bungalow. The boys of the manual-arts classes of Plattsburg, Missouri, have built a five-room bungalow on a lot near the high school. The house will be sold at auction the last day of school.

Class in Interior Wiring at Springfield. The class in interior wiring at Springfield, Missouri, is conducted on a half-day basis, with one-half day devoted to general high-school electricity. The class gives considerable time to repair and extension work on the property of the school district. Mr. Lyle is the instructor.

Missouri Vocational Association. The first meeting of the Missouri Vocational Association for the purpose of organizing, will be held November 11, 1927, at St. Louis. The meeting will be a dinner at which the officers and delegates to the next American Vocational Association meeting will be chosen. The speakers at this meeting will be either Dr. E. A. Lee of the University of California, or Dr. Charles A. Prosser, of Minneapolis, as well as other prominent persons in the various divisions of vocational education in the state. Missouri is one of the few states which is not now affiliated with the national association and it is desired that all persons and teachers interested in vocational education join in solving the problems in vocational training and assisting their coworkers in vocational education.

Courses for 1927-28. The David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo., has announced new day and evening courses for the year 1927-28. The day courses are open to men and to boys over 14 years who have completed the sixth grade. A tuition fee of $45 a year is required. The evening courses are open to mechanics and apprentices who desire to increase their earning power and a tuition fee of $10 to $40 is required.

Illinois Vocational Society Will Meet. The second annual meeting of the Illinois Society for Vocational and Practical Arts Education will be held November 11-12, at Chicago, Illinois. The Illinois Home Economics Association will meet with the society beginning with November 10. There will be general and sectional meetings of both organizations with a joint session on November 11. The sessions will take place in the Hotel Sherman and a large exhibit will be held in connection with the meeting.

Revise Course for Mechanic-Arts High School. The course of study for the Mechanic-Arts High School of Boston, Mass., has been revised to provide a new arrangement of subjects for the first, second, third, and fourth years. Under the new arrangement, ten periods are to be given to woodworking and two to drawing in the first year; ten periods will be given to patternmaking and forge or sheet-metal work and three to drawing in the A group of the second year; in the B group, ten periods will be given to patternmaking and forging or sheet-metal work and three to drawing. In the third year, ten periods will be given to machine-shop practice or sheet-metal work, and three to drawing in the A group, while machine-shop practice or sheet-metal work will be given in six periods and drawing in two periods. In the fourth year, advanced laboratory or shopwork will be given in ten periods and architectural drawing, machine design, or industrial design will be given in three periods in the A group.

Homemakers' School Second Largest. The College of Industrial Arts, Denton, Texas, had an enrollment of over 2,000 students. This makes it the second largest girls' school. It was opened in 1903 with its principal aim the training of homemakers. Trades and professional courses for women are also offered.

San Antonio offered printing instruction as a part of the evening-school curriculum. Composition, linotype work, keyboard practice, and other units were offered.

Home-Economics Cottage. East Bernard, Texas, has constructed a home-economics cottage which has attracted state-wide attention because of its adaptability and efficient arrangement.

Houston, Texas, had an enrollment of over 4,000 students in night-school classes. More than 50 courses were offered, including

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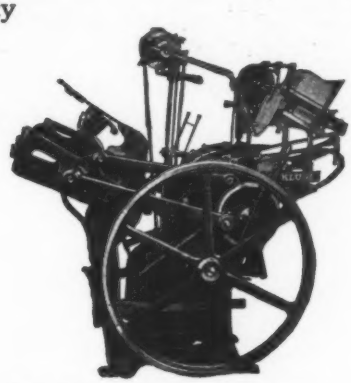

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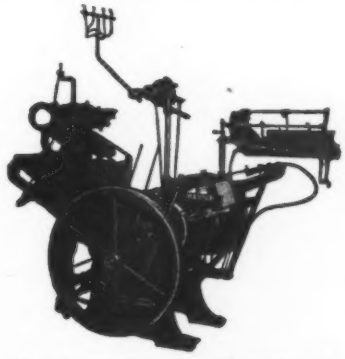

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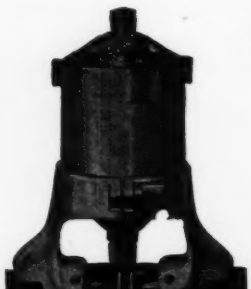

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Continuation School in Second Year. This is the second year of operation for the continuation school at East Liverpool, Ohio. The school has made rapid strides along various lines and the local industries have cheerfully cooperated.

Ceramic School Popular. The ceramic school, which was established at East Liverpool, Ohio, two years ago as a part of the high-school course, has proved successful. The industries of the city have become interested in the work and have contributed $4,000 with which to purchase equipment and supplies.

New Trade Schools in Connecticut. The Connecticut state board of education has been given $120,000 for the establishment and maintenance of a trade school in Hartford, and $50,000 for one at Willimantic, under the provisions of a bill approved by the legislature.

At a recent meeting of the Southern Association of Colleges a change was made in the regulations concerning college-entrance credits. Under the new plan, one year of high-school units may be transferred to the junior school. Many southern junior high schools will be able to extend their industrial-arts and guidance courses since the stress of college-entrance influence has been removed to the senior school.

A Film of Agricultural Projects. The state and national vocational departments have cooperated in preparing a film of the vocational agricultural projects turned out by the vocational department at Kenton, Ohio. The Kenton vocational department is the largest in the state and the film of its projects will be shown both in the state and in the nation. The vocational agricultural department has two full-time instructors and is in charge of Mr. E. R. Tam, head of the department.

Evening Class in Plumbing. An evening class for plumbers has been held in the Whittier School at Haverhill, Mass., for the benefit of young men employed as apprentices in the trade. The class was in charge of Mr. Turner, who is also instructor in the day school.

Will Receive $6,000 for Smith-Hughes Vocational Work. The vocational department of the Wheeling, W. Va., schools will receive $6,000 as reimbursement for Smith-Hughes vocational work. During the last year $5,000 was received from the fund.

Build Articles for New Trade School. The manual-training department of the Wheeling, W. Va., schools has constructed a number of pieces of equipment for the new McKinley Trade School. The cabinetmaking department made blackboards, bulletin boards, and a cabinet for the printshop. The sheet-metal class made trays to hold drawing instruments and window panes for the use of flowers. The machine shop made a traveling crane and a number of steel frames for electric-wiring boards.

Chicago, Ill. The board of education has been asked to approve a recommendation providing for the erection of a school of commerce and business administration to accommodate approximately three thousand students. The building will afford accommodations for the educational department which will be arranged like a regular office building, with waiting room, a room for clerks, and an office for the heads of departments and divisions, as well as ample storage space for records and supplies.

Cooperative Industrial Training at Ambridge. The school authorities at Ambridge, Pa., in cooperation with officials of the vocational division of the state education department, are working out plans for a cooperative industrial-training plan. The new plan follows a survey of the local industries made some time ago.

PERSONAL NEWS

Mr. Lewis Gustafson, president of the Ranken, Jr., School of Mechanical Trades, St. Louis, Mo., has returned from Biloxi, Miss., where he went in the hope of benefiting his health.

James M. Hall, formerly acting chief of the trade and industrial-education service of the Federal Board for Vocational Education, has resigned to become director of the Camden county Vocational School of Camden county, New Jersey. An appropriation of $500,000 has been made for the operation of the school which is to serve the industrial firms of the county.

Clarence F. Ramsey, for the past five years assistant superintendent of the boys' vocational school at Lansing, Michigan, has been appointed superintendent of the state school at Coldwater by Governor Green.

Mr. Melvin S. Lewis, who has been appointed associate professor of education in the University of Indiana, will assume his new duties in September. Mr. Lewis takes over the vocational work developed by the education school under the direction of Dean H. L. Smith and Dr. James C. Miller. He succeeds Dr. W. W. Patty, who resigned in 1926 to accept a similar position in Ohio State University.

Mr. P. W. Bell of Winnemucca, N. Mex., has been appointed to take charge of the course in vocational carpentry. He will also have charge of the manual-training work in the lower grades.

Mr. H. H. Krickenberger, manual-training instructor at Greenville, Ohio, has been elected president of the Miami Valley Industrial Arts Association for the next year.